SELF ASSESSMENT REPORT (SAR) FORMAT
UNDERGRADUATE ENGINEERING PROGRAMS (TIER-I)
FIRST TIME ACCREDITATION

(Applicable for all the programs, except those granted full accreditation for 5 years as per Jan 2013 Manual)

Department of Chemical Engineering and Materials Science

AMRITA SCHOOL OF ENGINEERING,
AMRITA VISHWA VIDYAPEETHAM,
AMRITANAGAR PO, ETTIMADAI,
COIMBATORE – 641112, TAMILNADU

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PART A: INSTITUTIONAL INFORMATION

1.	**Name and Address of the Institution**	:	**Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Amritanagar PO, Ettimadai, Coimbatore – 641112, Tamilnadu.**
2.	**Name and Address of the Affiliating University**	:	**Amrita Vishwa Vidyapeetham, Amritanagar PO, Ettimadai, Coimbatore – 641112, Tamilnadu.**
3.	**Year of establishment of the Institution**	:	**1994**
4.	**Type of Institution**	:	Institute of National Importance: ☐ University: ☐ Deemed University: ☑ Yr. 2003 Autonomous: ☐ Any other (Please specify): ☐
	Note	:	1. In case of Autonomous and Deemed University, mention the year of grant of status by the authority. 2. In case of University Constituent Institution, please indicate the academic autonomy status of the Institution as defined in 12th Plan guidelines of UGC. Institute should apply for Tier 1 only when fully academically autonomous.
5.	**Ownership Status**	:	Central Government ☐ State Government ☐ Government-aided ☐

Self-Financing	☐
Trust	☑
Society	☐
Section 25 Company	☐
Any other (please specify)	☐

Provide Details : The sponsoring trust of the institute is **MATA AMRITANANDAMAYI MATH.** Amrita School of Engineering is under the ambit of **AMRITA VISHWA VIDYAPEETHAM (DEEMED UNIVERSITY).**

6. Other Academic Institutions of the Trust/Society/Company etc., if any:

Table A.6

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
Coimbatore Campus			
Amrita School of Business, Coimbatore	**1996**	MBA	**Coimbatore, Tamil Nadu**
Amritapuri Campus			
Amrita School of Engineering, Amritapuri, Kollam, Kerala	**2002**	B.Tech - Computer Science and Engg.	**Amritapuri, Kollam, Kerala**
		B.Tech - Electronics and Communication Engg.	
		B.Tech - Electrical and Electronics Engg.	
		B.Tech - Mechanical Engg.	
		M.Tech - Computer Science and Engineering	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		M.Tech - Cyber Security	
		M.Tech - Power and Energy Engineering	
		M.Tech - Robotics & Automation	
		M.Tech - Thermal and Fluid Engineering	
		M.Tech - VLSI Design	
		M.Tech - Wireless Networks and Applications	
		MCA	
		Ph.D	
Amrita School of Arts and Sciences, Amritapuri, Kollam, Kerala	**2003**	B.Com - Bachelor of Commerce	**Amritapuri, Kollam, Kerala**
		BCA - Bachelor of Computer Applications	
		BBA - Bachelor of Business Administration	
		M.Com - Master of Commerce	
		M.Sc. Chemistry	
		M.Sc. Physics	
		M.Sc Mathematics	
		MSW - Master of Social Work	
		MA English (2 Year)	
		MA Philosophy	
		M.Sc. Physics & Maths - Integrated 5 Yr. Course	
		M.Sc Chemistry - Integrated 5 Yr. Course	
		M.Sc Mathematics - Integrated 5 Yr. Course	
		M.A English - Integrated 5 Yr. Course	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		Ph.D	
Amrita School of Biotechnology, Amritapuri, Kollam, Kerala	**2005**	B.Sc. Biotechnology	**Amritapuri, Kollam, Kerala**
		B.Sc. Microbiology	
		M.Sc. Biotechnology	
		M.Sc. Bioinformatics	
		M.Sc. Microbiology	
		Ph.D	
Amrita School of Ayurveda, Amritapuri, Kollam, Kerala	**2004**	BAMS	**Amritapuri, Kollam, Kerala**
		MD - Ayurveda Samhita	
		MD - Dravyaguna Vigyana	
		MD - Kayachikitsa	
		MD - Panchakarma	
		MD - Rasashastra & Bhaishajya Kalpana	
		MD - Swasthavritta	
		MS - Prasuti Tantra & Streeroga	
		MS - Shalakya Tantra (Netra Roga Vigyana)	
		MS - Shalya Tantra (Samanya)	
		Ph.D	
Bangalore Campus			
Amrita School of Engineering, Bangalore, Karnataka	**2002**	B.Tech - Computer Science and Engg.	**Bangalore, Karnataka**
		B.Tech - Electronics and Communication Engg.	
		B.Tech - Electrical and Electronics Engg.	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		B.Tech - Electronics and Instrumentation Engg.	
		B.Tech - Mechanical Engg.	
		M.Tech - Communication Engg. & Signal Processing	
		M.Tech - Computer Science and Engineering	
		M.Tech - Embedded Systems	
		M.Tech - Power Electronics	
		M.Tech - Thermal Sciences & Energy Systems	
		M.Tech - VLSI Design	
		M.Tech - Computer Science and Engineering Data Science **(Part Time)**	
		Ph.D	
Kochi Campus			
Amrita School of Medicine, Kochi, Kerala	**2002**	MBBS	**Kochi, Kerala**
		B.Sc. - Anaesthesia Technology	
		B.Sc. - Cardiac Perfusion Technology	
		B.Sc. - Cardio Vascular Technology	
		B.Sc. - Diabetes Sciences	
		B.Sc. - Dialysis Therapy	
		B.Sc. - Echocardiography Technology	
		B.Sc. - Emergency Medical Technology	
		B.Sc. - Medical Laboratory Technology	
		B.Sc. - Medical Radiologic Technology	
		B.Sc. - Neuro Electro Physiology	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		B.Sc. - Optometry (Regular)	
		B.Sc. - Optometry (Lateral Entry)	
		B.Sc. - Physician Assistant	
		B.Sc. - Respiratory Therapy	
		BASLP - Bachelor of Audiology and Speech Language Pathology	
		M.Sc. - Clinical Nurition Foods & Sciences	
		M.Sc. - Medical Laboratory Technology (Biochemistry)	
		M.Sc. - Medical Laboratory Technology (Microbiology)	
		M.Sc. - Medical Laboratory Technology (Pathology)	
		M.Sc. - Biostatistics	
		M.Sc.- Deglutology & Swallowing Therapy (DSD)	
		M.Sc. - Neuro Electro Physiology	
		MPH - Master of Public Health	
		MHA - Hospital Administration	
		M.Sc - Cardio Vascular Technology	
		M.Sc. - Diabetes Sciences	
		M.Sc. - Dialysis Therapy	
		M.Sc. - Physician Assistant in Medical Oncology	
		M.Sc. - Trauma & Crital Care	
		M.Sc. - Respiratory Therapy (RPT)	
		MD Anesthesiology	
		MD Biochemistry	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		MD Community Medicine	
		MD Dermatology, Venerology and Leprosy	
		MD Emergency Medicine	
		MD Forensic Medicine	
		MD General Medicine	
		MD Geriatrics	
		MD Microbiology	
		MD Nuclear Medicine	
		MD Paediatrics	
		MD Pathology	
		MD Physical Medicine & Rehabilitation	
		MD Psychiatry (PSYCHOLOGICAL MEDICINE)	
		MD Radio Diagnosis	
		MD Radio-Therapy	
		MD Respiratory Medicine	
		MD Tuberculosis and Respiratory Diseases	
		MS General Surgery	
		MS Obstetrics and Gynecology	
		MS Ophthalmology	
		MS Orthopedics	
		MS Otorhinolaryngology	
		DM Cardiac Anaesthesia	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		DM Cardiology	
		DM Endocrinology	
		DM Medical Gastroenterology	
		DM Medical Oncology	
		DM Nephrology	
		DM Neurology	
		DM Paediatric Cardiology	
		DM Rheumatology	
		DM Pulmonary Medicine	
		MCh. Cardio Vascular & Thorasic Surgery	
		MCh. Head and Nech Surgery	
		MCh. Neuro Surgery	
		MCh. Pediatric Surgery	
		MCh. Plastic & Reconstructuve Surgery	
		MCh. Gynaecological Oncology	
		MCh. Reproductive Medicine	
		MCh. G I Surgery (Surgical Gastroenterlogy)	
		MCh. Urology	
		PG Diploma in Child Health (D.CH)	
		PG Diploma in Gynecology & Obstetrics (D.GO)	
		PG Diploma in Dermatology, Venerology and Leprosy (D.D.V.L.)	
		PG Diploma in Medical Radio Diagnosis (D.MRD)	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		PG Diploma in Opthalmology (D.O.)	
		PG Diploma in Psychological Medicine (D.PM)	
		PG Diploma in Otorhinolaryngology(D. L. O)	
		PG Diploma in Medical Radio-Therapy (DMRT)	
		PG Diploma in Medical Radiological Sciences	
		M.Phil Clinical Psychology	
		M.Phil Hospital Administration	
Amrita College of Nursing, Kochi, Kerala	**2002**	B.Sc. Nursing	**Kochi, Kerala**
		M Sc Nursing - Medical Surgical Nursing	
		M Sc Nursing -OBG Nursing	
Amrita School of Pharmacy, Kochi, Kerala	**1997 / 2004**	B.Pharm	**Kochi, Kerala**
		Pharm.D(Regular) 6 Year Course	
		M.Pharm - Pharmacy Practice	
		M.Pharm - Pharmaceutical Chemistry	
		M.Pharm - Pharmaceutics	
		M.Pharm - Pharmacology	
		Pharm.D(P.B) 3 Year Course	
		Ph.D	
Amrita School of Dentistry, Kochi, Kerala	**2003**	BDS	**Kochi, Kerala**
		MDS - Conservative Dentistry & Endodontics	
		MDS - Oral & Maxillofacial Surgery	
		MDS - Oral Medicine & Radiology	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		MDS - Oral Pathology & Microbiology	
		MDS - Orthodontics & Dentofacial Orthopedics	
		MDS - Pedodontics and Preventive Dentistry	
		MDS - Periodontology	
		MDS - Prosthodontics and Crown & Bridge	
		MDS - Public Health Dentistry	
		Diploma in Dental Mechanics	
		Ph.D	
Amrita School of Arts and Sciences, Kochi, Kerala	**2003**	B.Com - (Taxation & Finance)	**Kochi, Kerala**
		B.Com - Finance & IT - Computer Applications)	
		B.Sc. Visual Media	
		BBA - Logistics Management	
		BBA - Bachelor of Business Administration	
		B.F.A - Photography	
		MCA	
		MFA - (ACM) Animation and Content Management	
		MFA - (AAA) Applied Art and Advertising	
		MFA - (DFM) Digital Film Making	
		M.Com (Finance and Systems)	
		MJMC - Master of Journalism and Mass Communication	
		M.Sc Mathematics	
		M.A (VM&C) - Visual Media & Communication	

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
		M.A (CC & A) - Corporate Communication & Advertising	
		M.A - English Language and Literature	
		M.A. - Journalism and Mass Communication	
		M.A English and Languages (Integrated 5 Yr.)	
		MCA Integrated 5 Yr. Course	
		M.Sc.Maths Integrated 5 Yr. Course	
		M.Phil (Commerce & Management)	
		M.Phil (English Language & Literature)	
		M.Phil (Computer Science & IT)	
		M.Phil (Computer Science & IT) **(Part Time)**	
		M.Phil (Mathematics)	
		M.Phil (Visual Media & Communication)	
		M.Phil (Visual Media & Communication) - **Part Time**	
		Ph.D	
Amrita Centre for Nanosciences, Kochi, Kerala	**2007**	M.Tech - Moleculer Medicine	**Kochi, Kerala**
		M.Tech - Nanomedical Sciences	
		M.Tech - Nanotechnology & Renewable Energy	
		M.Sc - Moleculer Medicine	
		M.Sc - Nanomedical Sciences	
		M.Sc Nanoscience and Nanotechnology	
		Ph.D	
Mysore Campus			

Other Academic Institutions of the Trust/Society/Company etc., if any:			
Name of the Institution(s)	**Year of Establishment**	**Programs of Study**	**Location**
Amrita School of Arts and Sciences, Mysore, Karnataka	**2003**	BBM - Bachelor of Business Management	**Mysore, Karnataka**
		BCA - Bachelor of Computer Applications	
		B.Com Regular - Bachelor of Commerce	
		B.Com Taxation - Bachelor of Commerce	
		B.Sc. Visual Media	
		BBA - Bachelor of Business Administration	
		B.Sc. - PCM	
		MCA	
		M.Com - Master of Commerce	
		M.Sc Visual Communication	
		B.Ed - Bachelor of Education	
		M.Sc Visual Communication - DFM	
		MCA - Integrated 5 Year	
		M Sc Visual Communication - Integrated 5 Year	
		B.Sc., B.Ed - PCM (Integrated)	
		Ph.D	

7. Details of all the programs being offered by the institution under consideration:

Table A.7

S. No.	Program Name	Name of the Department	Year of Start	Intake	Increase/ Decrease in intake, if any	Year of Increase/ Decrease	AICTE Approval	Accreditation Status*
1	B.Tech. - AEROSPACE ENGINEERING	AEROSPACE ENGINEERING	**2007**	**60**	**Nil**	**Nil**	**F.No. Southern/1-707695364/2012/EOA Dated 10.05.2012 F.No. Southern/1-3516200899/2018/EOA Dated 04-Apr-2018**	**Eligible but not applied**
2	B.Tech. - CIVIL ENGINEERING	CIVIL ENGINEERING	**2008**	**60**	**Nil**	**Nil**	**F.No. Southern/1-414170221/2011/ EOA Dated 01.09.2011 F.No. Southern/1-3516200899/2018/EOA Dated 04-Apr-2018**	**Eligible but not applied**
3	M.Tech. - STRUCTURAL AND CONSTRUCTION ENGINEERING	CIVIL ENGINEERING	**2014**	**25**	**Nil**	**Nil**		**Eligible but not applied**

4	B.Tech. - CHEMICAL ENGINEERING	CHEMICAL ENGINEERING	**2007**	**60**	**Nil**	**Nil**	**F.No. Southern/1-707695364/2012/ EOA Dated 10.05.2012 F.No. Southern/1-3516200899/2018/EOA Dated 04-Apr-2018**	**Eligible but not applied**
5	M.Tech. - MATERIALS SCIENCE & ENGINEERING	CHEMICAL ENGINEERING	**2015**	**18**	**Nil**	**Nil**		**Eligible but not applied**
6	B.Tech. - ELECTRICAL & ELECTRONICS ENGINEERING	ELECTRICAL & ELECTRONICS ENGINEERING	**1994**	**40**	**Increase Intake - 20 + 60**	***1996*****, 2014.**	**No. F 732-50-9/RC/94 Dated 12.08.1994, ** Approval letter for Increase intake not available F.No. Southern/1-2016442706/2014/EOA Dated 04.06.2014 F.No. Southern/1-3516200899/2018/EOA Dated 04-Apr-2018**	**Eligible but not applied**
7	M.Tech - POWER ELECTRONICS	ELECTRICAL & ELECTRONICS ENGINEERING	**2003**	**18**	**Increase Intake - 7 + 5**	**2005, 2018.**	**F.No.PG/TN/M.TECH./2004/ECE-0078-0057 Dated 25.06.2004, F.No.730-52-203(E)/ET/97 Dated 19.09.2005, F.No. Southern/1-3516200899/2018/EOA Dated 04-Apr-2018**	**Eligible but not applied**

8	M.Tech - EMBEDDED SYSTEMS	ELECTRICAL & ELECTRONICS ENGINEERING	**2008**	**24**	**Increase Intake - 6**	**2018**	**F.No. Southern/1-707695364/2012/EOA Dated 10.05.2012 F.No. Southern/1-3516200899/2018/EOA Dated 04-Apr-2018**	**Eligible but not applied**
9	M.Tech - CONTROL & INSTRUMENTATION ENGINEERING	ELECTRICAL & ELECTRONICS ENGINEERING	**2016**	**18**	**-**	**-**	**-**	**Eligible but not applied**
10	M.Tech - RENEWABLE ENERGY TECHNOLOGIES	ELECTRICAL & ELECTRONICS ENGINEERING	**2014**	**18**	**-**	**-**	**-**	**Eligible but not applied**

* Write applicable one:

Applying first time
Granted provisional accreditation for two/three years for the period(specify period)
Granted accreditation for 5/6 years for the period (specify period)
Not accredited (specify visit dates, year)
Withdrawn (specify visit dates, year)
Not eligible for accreditation
Eligible but not applied

8. Programs to be considered for Accreditation vide this application

Table A.8

S. No.	Program Name
1	**B.Tech. - AEROSPACE ENGINEERING**
2	**B.Tech. - CIVIL ENGINEERING**
3	**B.Tech. - CHEMICAL ENGINEERING**
4	**B.Tech. - ELECTRICAL & ELECTRONICS ENGINEERING**

9. Total number of employees:

A. Regular Employees (Faculty and Staff):

Table A.9a

Items		CAY 2018-19		CAYm1 2017-18		CAYm2 2016-17	
		Min	Max	Min	Max	Min	Max
Faculty in Engineering	M	165		172		182	
	F	94		101		115	
Faculty in Maths, Science & Humanities teaching in engineering Programs	M	57		57		37	
	F	40		39		30	
Non-teaching staff	M	290		289		274	
	F	73		75		80	

Note:

Minimum 75% should be Regular/Full Time faculty and the remaining shall be Contractual Faculty/Adjunct Faculty/Resource Source from industry as per AICTE norms and standards.

The contractual Faculty will be considered for assessment only if a faculty is drawing a salary as prescribed by the concerned State Government for the contractual faculty in the respective cadre and who have taught over consecutive 4 semesters.

CAY – Current Academic Year
CAYm1- Current Academic Year minus1= Current Assessment Year
CAYm2 - Current Academic Year minus2=Current Assessment Year minus 1

B. Contractual Staff Employees (Faculty and Staff): (Not covered in Table A):

Table A.9b

Items		CAY 2018-19		CAYm1 2017-18		CAYm2 2016-17	
		Min	Max	Min	Max	Min	Max
Faculty in Engineering	M	7		8		7	
	F	1		0		1	
Faculty in Maths, Science &Humanities teaching in engineering Programs	M	2		4		2	
	F	1		6		0	
Non-teaching staff	M	16		12		5	
	F	2		3		2	

10. Total number of Engineering Students:

Table A.10

Item	CAY 2018-19			CAYm1 2017-18			CAYm2 2016-17		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
B.Tech – I Year	850	224	**1074**	988	256	**1244**	877	257	**1134**
B.Tech – II Year	982	254	**1236**	863	251	**1114**	798	219	**1017**
B.Tech – III Year	855	249	**1104**	793	218	**1011**	758	233	**991**
B.Tech – IV Year	776	218	**994**	753	233	**986**	834	314	**1148**
Total	**3463**	**945**	**4408**	**3397**	**958**	**4355**	**3267**	**1023**	**4290**
M.Tech – I Year	141	84	**225**	267	127	**394**	214	156	**370**
M.Tech – II Year	256	124	**380**	203	149	**352**	218	165	**383**
M.Tech – III Year	0	0	**0**	23	0	**23**	2	0	**2**
Total	**397**	**208**	**605**	**493**	**276**	**769**	**434**	**321**	**755**

(Instruction: The data may be categorized in tabular form separately for undergraduate, postgraduate engineering, other program, if applicable)

Note:

In case the institution is running programs other than engineering programs, a separate table giving similar details is to be included.

11. Vision of the Institution : Institution: To be a global leader in the delivery of engineering education, transforming individuals to become creative, innovative, and socially responsible contributors in their professions.

12. Mission of the Institution :

- To provide best-in-class infrastructure and resources to achieve excellence in technical education
- To promote knowledge development in thematic research areas that have a positive impact on society, both nationally and globally
- To design and maintain the highest quality education through active engagement with all stakeholders – students, faculty, industry, alumni and reputed academic institutions
- To contribute to the quality enhancement of the local and global education ecosystem
- To promote a culture of collaboration that allows creativity, innovation, and entrepreneurship to flourish, and
- To practice and promote high standards of professional ethics, transparency, and accountability

13. Contact Information :

i. **Head of Institution**
Name: Dr. SASANGAN RAMANATHAN
Designation: DEAN
Mobile No: 7598155285
Email id: sasangan@amrita.edu

ii. **NBA coordinator**
Name: Dr. MAHADEVAN S
Designation: DEPUTY DEAN
Mobile No: 9944312309
Email id: **dydean@cb.amrita.edu**

PART B: CRITERIA SUMMARY

Name of the program: Chemical Engineering and Materials Science

Criterion No.	Criteria	Marks/Weightage
Program-Level Criteria		
1.	Vision, Mission and Program Educational Objectives	50
2.	Program Curriculum and Teaching –Learning Processes	100
3.	Course Outcomes and Program Outcomes	175
4.	Students' Performance	100
5.	Faculty Information and Contributions	200
6.	Facilities and Technical Support	80
7.	Continuous Improvement	75
Institute-Level Criteria		
8.	First Year Academics	50
9.	Student Support Systems	50
10.	Governance, Institutional Support and Financial Resources	120
	TOTAL	**1000**

PROGRAM-LEVEL CRITERIA

CRITERION 1: Vision, Mission and Program Educational Objectives (50)

1.1. State the Vision and Mission of the Department and Institute (5)

Vision (Department)

To be recognized nationally and internationally for excellence in teaching and research in chemical engineering & materials science, integrated with, and practicing, social responsibility and value systems.

Mission (Department)

The department strives for a passionate and committed drive towards continuous improvement in

- M1: the delivery, standards, and currency of education,
- M2: administration efficiency,
- M3: scientific research to create new processes, products, methods, materials, or systems that impact and are beneficial to society, and
- M4: meeting and exceeding the needs of the stakeholders and Amrita Vishwa Vidyapeetham.

Vision of the Institution	**:**	Institution: To be a global leader in the delivery of engineering education, transforming individuals to become creative, innovative, and socially responsible contributors in their professions.
Mission of the Institution	**:**	• To provide best-in-class infrastructure and resources to achieve excellence in technical education • To promote knowledge development in thematic research areas that have a positive impact on society, both nationally and globally • To design and maintain the highest quality education through active engagement with all stakeholders – students, faculty, industry, alumni and reputed academic institutions • To contribute to the quality enhancement of the local and global education ecosystem • To promote a culture of collaboration that allows creativity, innovation, and entrepreneurship to flourish, and

- To practice and promote high standards of professional ethics, transparency, and accountability

1.2. State the Program Educational Objectives (PEOs) (5)

(State the PEOs (3 to 5) of program seeking accreditation)

Program Educational Objectives (UG)

To produce graduates in chemical engineering, who, immediately after graduation or within five years of it:

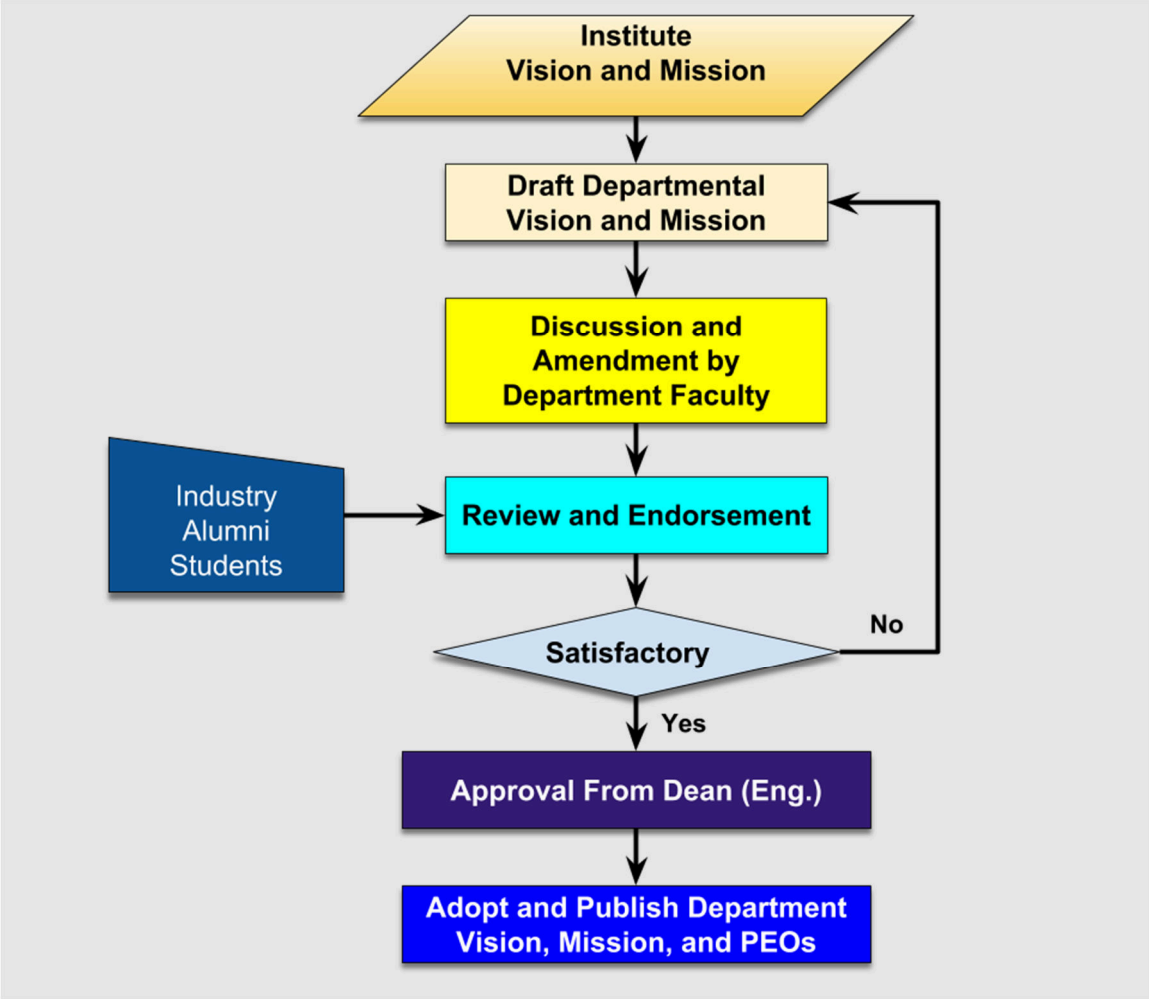
- PEO1: can effectively and efficiently apply the knowledge for engineering practice, research, and management in the chemical and allied industries while adhering to ethical, health, environmental, social, safety and economic values,
- PEO2: can make worthy progress towards the acquisition of advanced degrees, are motivated to pursue additional training and certifications, and use their knowledge and skills to participate in the activities of local/national/international professional societies,
- PEO3: have good written and oral communication skills, and communicate their ideas and knowledge via scholarly articles, patents, delivery of effective presentations, and/or training of co-workers and associates, and
- PEO4: strive for continuous self-development and life-long learning.

1.3. Indicate where the Vision, Mission and PEOs are published and disseminated among stakeholders (15)

1. The Vision, Mission, and PEOs are communicated to students and faculty via poster boards at key locations in the department, near classrooms, and in labs.
2. The information is included in the curriculum and syllabus document.
3. They are communicated to internal stakeholders (Academic Council, faculty & staff, and administrators) via email.
4. The information is also circulated to external stakeholders (Board of Studies members, alumni, employers, and collaborating institutions) via email.
5. The information is displayed in the department website, and the link is shared when requested by funding agencies, employers, and other interested parties.
6. Additionally, the information is included in communication material associated with some of the academic activities of the department, such as conferences, workshops, proposals for research grant applications, and student orientation.

1.4. State the process for defining the Vision and Mission of the Department, and PEOs of the program (15)

(Articulate the process involved in defining the Vision and Mission of the department and PEOs of the program.)



1.5. Establish consistency of PEOs with Mission of the Department (10)

PEO Statements	M1	M2	M3	M4
PEO1: Knowledge for Engineering Practice:	3	2	3	1
PEO2: Professional Development:	3	2	1	3
PEO3: Effective Communication and Learning Skills	3	2	1	2
PEO4: Self-development with Societal Contribution	3	1	2	2

Table B.1.5: PEO statements

PEO 1 maps strongly with M1 and M3, moderately with M2 and slightly with M4 mission components. It is justified through lectures, practicals, tutorial sessions, final year projects, workshops, technical paper presentation, expert lectures and industry institute interactions.
PEO 2 maps strongly with M1 and M4, moderately with M2 and slightly with M3 mission components. It is justified through rigorous implementation of the academic program and through implementation of Outcome Based Education (OBE).
PEO 3 maps strongly with M1, moderately with M2 and M4 and slightly with M3 mission components. This is justified through emphasis on soft skills development, seminar presentation, project presentation and other co- curricular activities.
PEO 4 maps slightly with M1 moderately with M3 and M4 and slightly with M2 mission components. This is justified through the medium of OBE and with emphasis on research and student projects that are relevant to society.

Note:
M1, M2, . . Mn are distinct elements of Mission statement. Enter correlation levels 1, 2 or 3 as defined below:
1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)
If there is no correlation, put "-"
Wherever the word "process" is used in this document its meaning is process formulation, notification to all the concerned, and implementation

CRITERION 2: Program Curriculum and Teaching-Learning Processes (100)

2.1. Program Curriculum (30)

2.1.1. State the process for designing the program curriculum (10)

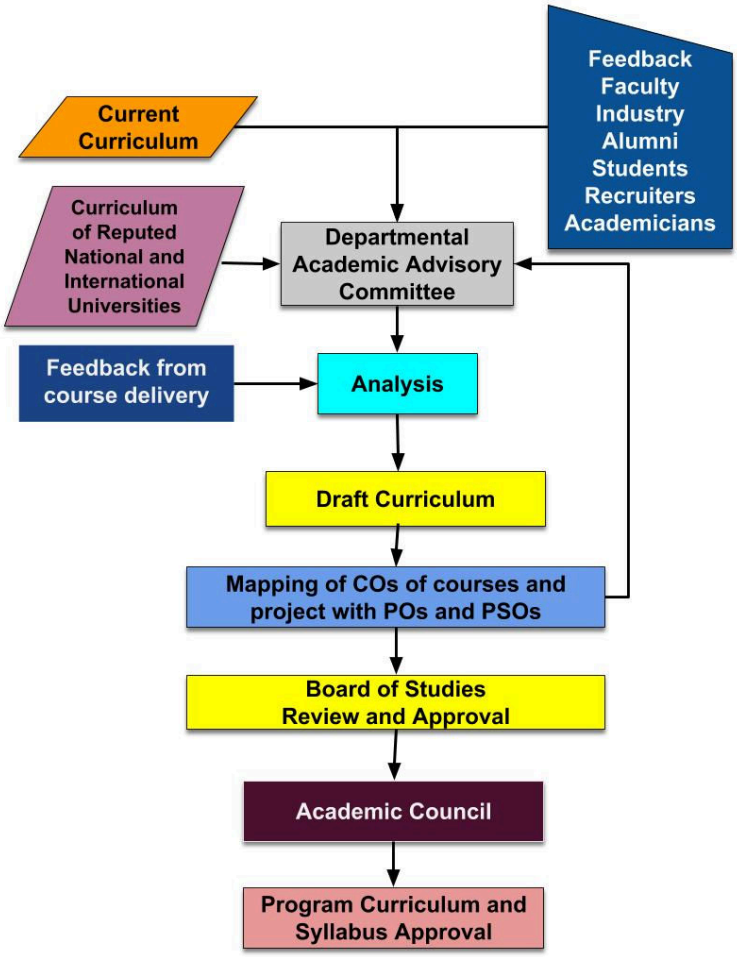


Figure B.2.1.1.1 Curriculum Designing Process

The curriculum is designed so as to provide skills and knowledge required for immediate employment after graduation as well as strong basis for higher studies. For this, the curriculum is framed with emphasis on the fundamentals of physical and chemical phenomena, mathematical modeling, and problem solving techniques. A balance of courses in basic science, engineering sciences, humanities including life skill and employment enhancement courses, program core, program electives and project work is incorporated in the curriculum.

The curriculum is generally revised every four years. For framing the curriculum, the current curriculum is analyzed and inputs from the faculty, alumni of the department, students, industry experts, academicians from reputed national institutes and recruiters are considered. A detailed

analysis and comparison with undergraduate Chemical Engineering curriculum in reputed universities in India and abroad is done with focus on the needs of the industry as well as requirements for pursuing higher studies. Analysis is done for attaining the PO/PSO's through the curriculum. Based on the analysis the Department Academic Advisory Committee prepares a draft curriculum. The draft curriculum and syllabus are presented to the Board of Studies (BoS) for review and approval. The curriculum and syllabus approved by the BoS is submitted to Chair, UG Programs. The final approval of curriculum and syllabus is done by the Academic Council of the University. When need arises, electives can be added to an existing curriculum on request of the department with approval of UGP Chair.

The curriculum was revised in 2015. Based on analysis of 2010 regulation curriculum, and inputs from various stakeholders, the following changes were made.

1. The course Introduction to Chemical Engineering was introduced in the second semester to provide students an overview of Chemical Engineering and introduce them to the unit operations / processes and problem solving approaches employed.
2. Mathematics courses in higher semesters was framed to incorporate relevance of contents to Chemical Engineering. The syllabus of Transforms and Partial Differential Equations, Probability and Statistics and Numerical Methods were framed to align with department needs.
3. A new lab course Chemical Engineering Instrumentation Lab was introduced in 4th semester to provide hands on training to students and to provide supervisory learning with open ended experiments with thrust on analysis and interpretation of results.
4. To give the students a strong foundation in Chemical Engineering, the four credit course, Introduction to Chemical Engineering is offered as two courses comprising of material balance in 3rd semester and energy balance and Thermodynamics in 4th semester.
5. Chemical Reaction Engineering course in 2010 curriculum was changed to be offered as Chemical Reaction Engineering I and Chemical Reaction Engineering II in 5th and 6th semesters to provide a stronger foundation in core courses.
6. Process Design and Integration was introduced in 7th semester to give students exposure to industry relevant design approaches and to make them industry ready.
7. A new three credit course, Project Based Learning, in 5th and 6th semesters provide students opportunity for supervised learning through team work.
8. The final year project will be completed in 2 phases in 7th and 8th semester to enable students to improve the quality and quantum of work.
9. Environmental Engineering was changed, to be offered as an elective course.
10. Biochemistry and Molecular Biology was removed as a core course, and instead, an elective in Biochemical Engineering is to be offered for interested students.
11. A new management elective Principles of Management and Accounting (15CHE473) was approved.

The process for the next curriculum revision was initiated in 2018. From 2018, the department has initiated soliciting feedback from alumni and students; the constitution of the BOS membership has been revised to enable such feedback.

2.1.2. Structure of the Curriculum (5)

The structure of the B.Tech. (Chemical Engineering) program is presented in Table B.2.1.2a and Table B.2.1.2b for 2015 revision and 2010 revision respectively. The details of contact hours comprising of Lecture (L), Tutorial (T) and Practical (P) along with credits for each subject is given in Tables B.2.1.2 a and B.2.1.2b. A contact hour is defined as an hour of scheduled instruction given to students per week for a semester.

Table B.2.1.2a Curriculum Structure (Revision 2015)

Course Code	Course Title	Total Contact Hours				Total Credits
		L	T	P	Total Hours	
15ENG111	Communicative English	2	0	2	4	3
15MAT111	Calculus and Matrix Algebra	2	1	0	3	3
15CSE100	Computational thinking and Problem Solving	3	0	2	5	4
15CHY100	Chemistry	3	0	0	3	3
15CHY181	Chemistry Lab	0	0	2	2	1
15MEC180	Workshop A	0	0	2	2	1
15MEC100	Engineering Drawing - CAD	2	0	2	4	3
15CUL101	Cultural Education I	2	0	0	2	2
15MAT121	Vector Calculus and Ordinary Differential Equations	3	1	0	4	4
15PHY100	Physics	3	0	0	3	3
15CSE102	Computer Programming	3	0	0	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	T	P	Total Hours	
15CHE111	Introduction to Chemical Engineering	3	0	0	3	3
15CHE112	Material Balances	3	1	0	4	4
15PHY181	Physics Lab	0	0	2	2	1
15EEE180	Workshop B	0	0	2	2	1
15CSE180	Computer Programming Lab	0	0	2	2	1
15CUL111	Cultural Education II	2	0	0	2	2
15CHE201	Energy Balances and Thermodynamics	3	0	2	5	4
15CHE202	Fluid Mechanics	3	1	0	4	4
15CHE203	Mechanical Operations	3	0	0	3	3
15CHY245	Instrumental Methods of Analysis	3	0	0	3	3
15MAT204	Transforms and Partial Differential Equations	2	1	0	3	3
	Humanities Elective I					2
15CHE281	Fluid Mechanics Lab	0	0	2	2	1
15CHE282	Mechanical Operations Lab	0	0	2	2	1
15AVP201	Amrita Value Program I	1	0	0	1	1
15CHE211	Chemical Engineering Thermodynamics	3	0	0	3	3
15CHE212	Chemical Technology	4	0	0	4	4
15CHE213	Process Heat Transfer	3	1	0	4	4

Course Code	Course Title	Total Contact Hours				Total Credits
		L	T	P	Total Hours	
	Science Elective	3	0	0	3	3
	Humanities Elective II					2
15CHE285	Chemical Engineering Instrumentation Lab	1	0	2	3	2
15CHE286	Chemical Technology Lab	0	0	2	2	1
15SSK221	Soft Skills I	1	0	2	3	2
15AVP211	Amrita Value Program II	1	0	0	1	1
15CHE301	Chemical Reaction Engineering I	3	0	0	3	3
15CHE302	Diffusional Mass Transfer Operations	3	1	0	4	4
15CHE303	Statics and Strength of Materials	3	1	0	4	4
15ENV300	Environmental Science and Sustainability	3	0	0	3	3
15MAT214	Probability and Statistics	2	1	0	3	3
15CHE381	Heat Transfer Lab	0	0	2	2	1
15CHE382	Strength of Materials Lab	0	0	2	2	1
15CHE391	Project Based Learning - Phase I	0	0	1	1	1
15SSK321	Soft Skills II	1	0	2	3	2
15CHE390	Live-in-Lab	0	0	3	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	T	P	Total Hours	
15CHE311	Chemical Reaction Engineering II	3	0	0	3	3
15CHE312	Equilibrium Staged Operations	3	1	0	4	4
15CHE313	Materials Technology	3	0	0	3	3
15CHE314	Process Dynamics and Control	3	1	0	4	4
15MAT302	Numerical Methods	2	0	2	4	3
15CHE385	Chemical Reaction Engineering Lab	0	0	2	2	1
15CHE386	Mass Transfer Lab	0	0	2	2	1
15CHE396	Project based Learning - Phase II	0	0	2	2	2
15SSK331	Soft Skills III	1	0	2	3	2
15CHE401	Process Design and Integration	3	0	0	3	3
15CHE402	Process Equipment Design and Drawing	2	0	2	4	3
15CHE403	Transport Phenomena	3	1	0	4	4
	Elective I	3	0	0	3	3
	Management Elective	3	0	0	3	3
15CHE481	Chemical Process Control Lab	0	0	2	2	1
15CHE482	Computer Aided Design Lab	1	0	2	3	2
15CHE495	Project Phase I	0	0	2	2	2
15CHE490	Live-in-Lab	0	0	3	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	T	P	Total Hours	
	Elective II	3	0	0	3	3
	Elective III	3	0	0	3	3
15CHE499	Project Phase II	0	0	10	10	10
PROGRAM ELECTIVES						
15CHY232	Biomaterials Science	3	0	0	3	3
15CHY244	Green Chemistry and Technology	3	0	0	3	3
15CHE431	Biochemical Engineering	3	0	0	3	3
15CHE432	Chemical Process Modelling and Simulation	3	0	0	3	3
15CHE433	Environmental Engineering for Process Industries	3	0	0	3	3
15CHE434	Interfacial Science and Engineering	3	0	0	3	3
15CHE435	Material Characterization and Spectroscopic Methods	3	0	0	3	3
15CHE436	Modern Separation Methods	3	0	0	3	3
15CHE437	Nanoscience and Nanotechnology	3	0	0	3	3
15CHE438	Petroleum Refining and Petrochemical Technology	3	0	0	3	3
15CHE439	Polymer Composites	3	0	0	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	T	P	Total Hours	
15CHE440	Polymer Materials - Structure Property Relations	3	0	0	3	3
15CHE441	Polymer Processing	3	0	0	3	3
15CHE442	Process Instrumentation	3	0	0	3	3
15CHE443	Process Intensification	3	0	0	3	3
15CHE444	Safety and Hazard Management in Chemical Industries	3	0	0	3	3
15CHE445	Solar Energy	3	0	0	3	3
MANAGEMENT ELECTIVES						
15CHE470	Fundamentals of Management	3	0	0	3	3
15CHE471	Managerial Economics and Accounting	3	0	0	3	3
15CHE472	Project Engineering of Process Plants	3	0	0	3	3
TOTAL						168

L - Lecture T - Tutorial P- Practical

Note :

* A maximum of One Elective course can be chosen from the Electives prescribed for other Branches or from under Science Electives.
Science and Humanities electives are open electives.

** **Live-in-Lab** - This initiative is to provide opportunities for students to get involved in coming up with technology solutions for societal problems. The students visit villages or rural sites during the vacations (after 4th semester or sixth semester) and if they identify a worthwhile project, they register for a 3-credit Live-in-Lab project, in the fifth or seventh semester. The objectives and projected outcome of the project are reviewed and approved by the Dept. chairperson and a faculty member assigned as the project guide. On completion of the project, the student submits a detailed project report. The report is evaluated and the students appear for a viva-voce test on the project. Students undertaking and registering for a Live-in-Lab project, are exempted from registering for an elective course in the higher semester.
# Seminars are project works may be considered as practical

Table B.2.1.2b Curriculum Structure (Revision 2010)

Course Code	Course Title	Total Contact Hours				Total Credits
		L	**T**	**P**	**Total Hours**	
ENG111	Communicative English	2	0	2	4	3
CHY100	Chemistry	3	0	0	3	3
MAT111	Calculus, Matrix Algebra and Ordinary Differential Equations	3	1	0	4	4
EEE100	Electrical Engineering	3	0	0	3	3
MEC100	Engineering Mechanics	3	1	0	4	4
MEC181	Engineering Drawing	1	0	3	4	2
CHY181	Chemistry Lab	0	0	3	3	1
MEC180	Workshop A	1	0	2	3	2
CUL101	Cultural Education I	2	0	0	2	2
ENG112	Technical Communication	2	0	2	4	3
PHY100	Physics	3	0	0	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	**T**	**P**	**Total Hours**	
MAT112	Vector Calculus, Fourier Series and Partial Differential Equations	3	1	0	4	4
ECE100	Electronics Engineering	3	0	0	3	3
CSE100	Computer Programing	3	0	0	3	3
MEC182	Computer Aided Drawing	1	0	3	4	2
PHY181	Physics Lab	0	0	3	3	1
EEE180	Workshop B	1	0	2	3	2
CSE180	Computer Programing Lab	0	0	3	3	1
CUL101	Cultural Education II	2	0	0	2	2
MAT211	Integral Transforms and Complex Analysis	3	1	0	4	4
CHE210	Introduction to Chemical Engineering	3	1	0	4	4
CHE211	Fluid Mechanics	3	1	0	4	4
CHE220	Inorganic Chemical Technology	3	0	0	3	3
CHE240	Inorganic and Physical Chemistry	3	1	0	4	4
	Humanities Elective I	1	0	2	3	2
CHE290	Inorganic and Physical Chemistry Lab	0	0	3	3	1
CHE291	Fluid Mechanics Lab	0	0	3	3	1

Course Code	Course Title	Total Contact Hours				Total Credits
		L	**T**	**P**	**Total Hours**	
MAT212	Mathematical Statistics and Numerical methods	3	1	0	4	4
CHE212	Chemical Engineering Thermodynamics	3	1	0	4	4
CHE213	Heat Transfer in Chemical Engineering	3	1	0	4	4
CHE221	Mechanical Operations	3	0	0	3	3
CHE241	Material Science and Strength of Materials	4	0	0	4	4
	Humanities Elective II	1	0	2	3	2
CHE292	Strength of Materials Lab	0	0	3	3	1
CHE293	Mechanical Operations Lab	0	0	3	3	1
SSK111	Soft Skills I	0	0	3	3	1
CHE310	Diffusional Mass Transfer Operations	3	1	0	4	4
CHE311	Chemical Reaction Engineering	3	1	0	4	4
CHE320	Organic Chemical Technology	3	0	0	3	3
CHE330	Advanced Topics in Chemical Engineering	0	0	3	3	1
	Science Elective I	3	0	0	3	3
ENV200	Environmental Studies	3	1	0	4	4

Course Code	Course Title	Total Contact Hours				Total Credits
		L	**T**	**P**	**Total Hours**	
CHE390	Chemical Technology Lab	0	0	3	3	1
CHE391	Heat Transfer Lab	0	0	3	3	1
SSK 112	Soft Skills II	0	0	3	3	1
CHE312	Equilibrium Staged Operations	3	1	0	4	4
CHE313	Computational Methods in Chemical Engineering	2	0	3	5	3
CHE331	Process Dynamics and Control	3	1	0	4	4
	Elective I	3	0	0	3	3
	Science Elective II	3	0	0	3	3
CHE392	Mass Transfer Lab	0	0	3	3	1
CHE393	Chemical Reaction Engineering Lab	1	0	3	4	2
CHE397	Seminar	0	0	3	3	1
SSK113	Soft Skills III	0	0	3	3	1
CHE400	Environmental Engineering for Process Industries	3	1	0	4	4
CHE410	Transport Phenomena	3	1	0	4	4
CHE430	Process Equipment Design and Drawing	1	0	3	4	2
CHE440	Biochemistry and Molecular Biology	3	0	0	3	3
	Elective II	3	0	0	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	**T**	**P**	**Total Hours**	
MNG400	Principles of Management	3	0	0	3	3
CHE490	Computer - aided Design Lab	1	0	3	4	2
CHE491	Chemical Process Control Lab	0	0	3	3	1
	Elective III	3	0	0	3	3
	Management Elective	3	0	0	3	3
CHE499	Project				10	10
PROGRAM ELECTIVES						
CHE351	Modern Separation Methods	3	0	0	3	3
CHE352	Petroleum Refining and Petrochemical Technology	3	0	0	3	3
CHE353	Biochemical Engineering	3	0	0	3	3
CHE450	Paper Pulp and Fertilizer Technology	3	0	0	3	3
CHE451	Safety and Hazard Management in Chemical Industries	3	0	0	3	3
CHE452	Pharmaceutical Technology	3	0	0	3	3
CHE453	Food and Bioprocess Engineering	3	0	0	3	3
CHE454	Catalysis in Refining and Petrochemicals	3	0	0	3	3

Course Code	Course Title	Total Contact Hours				Total Credits
		L	**T**	**P**	**Total Hours**	
CHE460	Molecular Modelling and Computational Chemistry	3	0	0	3	3
CHE461	Chemical Process Modelling and Simulation	3	0	0	3	3
CHE462	Computational Methods in Fluid Dynamics	3	0	0	3	3
CHE371	Interfacial Science and Engineering	3	0	0	3	3
CHE372	Polymer Materials and Rheology	3	0	0	3	3
CHE373	Material Characterization and Spectroscopic Methods	3	0	0	3	3
CHE471	Nanoscience and Nanotechnology	3	0	0	3	3
MANAGEMENT ELECTIVES						
CHE480	Project Engineering of Process Plants	3	0	0	3	3
CHE481	Management and Economics of Chemical Processes	3	0	0	3	3
MEC353	Optimization Techniques in Engineering	3	0	0	3	3
TOTAL						177

L - Lecture T - Tutorial P- Practical

2.1.3. State the components of the curriculum (5)

Program curriculum grouping based on course components

The curriculum for B.Tech. (Chemical Engineering) comprises (i) basic sciences (II) engineering sciences (iii) humanities and social sciences (iv) program core (v) program electives (vi) open electives and (vii) project components. Tables 2.1.3.a and 2.1.3.b give the program curriculum grouping based on course components for 2015 regulation and 2010 regulation respectively. The total contact hours is the cumulative sum of the contact hours per week of the all the subjects in each category.

Table B.2.1.3a: Program curriculum grouping based on course components for 2015 curriculum regulation.

Course Component	Curriculum Content (% of total program credits)	Total contact hrs.	Total Credits
Basic Sciences	17.86	495	27
Engineering Sciences	7.74	270	13
Humanities and Social Sc.	14.88	435	21
Program Core	45.24	1305	76
Program Electives	5.36	135	9
Open Electives	0		
Project(s)	8.93	225	15
Internships/Seminars			
Any other (Please specify)		45	3
TOTAL CREDITS			168

Note: **Live-in-Lab** Students undertaking and registering for a 3 credit Live-in-Lab project, are exempted from registering for an elective course in the higher semester.

Table B.2.1.3b: Program curriculum grouping based on course components for 2010 curriculum regulation.

Course Component	Curriculum Content (% of total program credits)	Total contact hrs.	Total Credits
Basic Sciences	16.95	510	30
Engineering Sciences	12.43	450	22
Humanities and Social Sc.	15.25	555	27
Program Core	44.63	1605	79
Program Electives	5.08	135	9
Open Electives	0		10
Project(s)	5.65	150	10
Internships/Seminars	0		
Any other (Please specify)			
TOTAL CREDITS			177

2.1.4. Identification of the extent of compliance for PO-PSO attainment

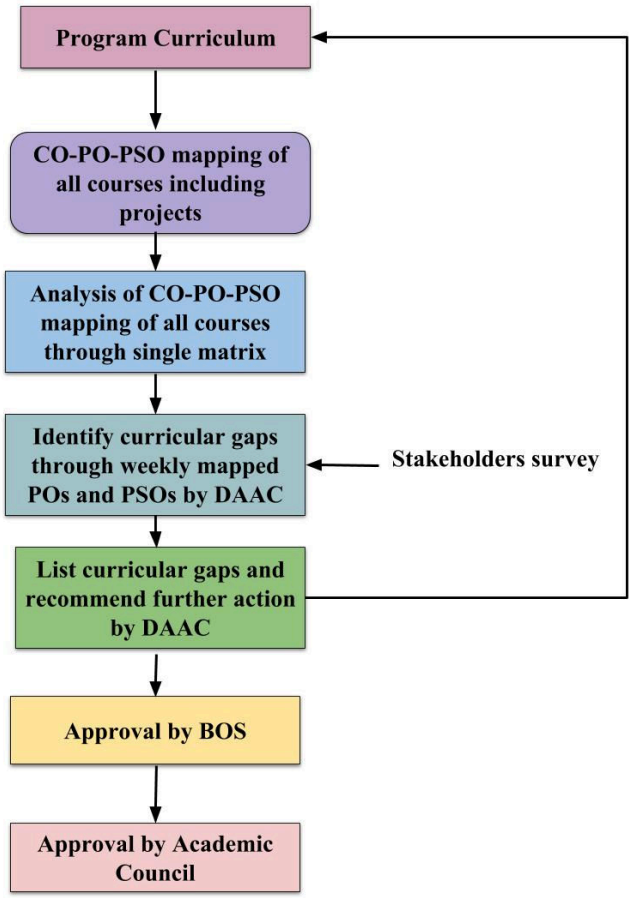


Figure B.2.1.4. Process to identify compliance of curriculum

Program curriculum and syllabus is submitted for approval by Board of Studies, Chair-UG Programs, and Academic Council. The curriculum is designed based on CO-PO-PSO mapping. The CO-PO-PSO of all the courses are mapped and in a single matrix. The Department Academic Advisory Committee (DAAC) analyzes the matrix and identifies weakly mapped POs and PSOs. Stakeholders feedback is also taken in the process. If needed the program curriculum is revised and the process repeated. The curriculum and CO-PO-PSO mapping approved by DAAC is placed before the board of studies for approval. After the BoS approval, the Chair of UG Program accords the final approval. The subject wise categorization under different POs and PSOs are listed in Table 2.1.4.a and Table 2.1.4.b for the 2015 and 2010 curriculum regulation respectively.

Table B.2.1.4 a Subject - PO - PSO mapping 2015 Regulation

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Communicative English	15ENG111								Y	Y	Y		Y			
Calculus and Matrix Algebra	15MAT111	Y	Y											Y	Y	
Computational Thinking and Problem Solving	15CSE100	Y	Y	Y		Y			Y	Y	Y					
Physics	15PHY100	Y	Y													
Chemistry	15CHY100	Y	Y	Y	Y											
Physics Lab	15PHY181	Y	Y	Y	Y	Y	Y									
Chemistry Lab	15CHY181	Y	Y	Y												
Workshop A	15MEC180	Y	Y	Y		Y				Y	Y		Y			
Workshop B	15EEE180	Y	Y	Y					Y	Y	Y		Y			
Engineering Drawing - CAD	15MEC100	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Vector Calculus and ODE	15MAT121	Y	Y	Y												
Computer Programming	15CSE102	Y	Y	Y												
Introduction to Chemical Engineering	15CHE111	Y	Y		Y	Y			Y					Y	Y	
Material Balances	15CHE112	Y	Y	Y	Y									Y	Y	
Computer Programming Lab	15CSE180	Y	Y	Y		Y										
Energy Balance and Thermodynamics	15CHE201	Y	Y	Y	Y									Y	Y	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Fluid Mechanics	15CHE202	Y	Y	Y	Y									Y	Y	Y
Mechanical Operations	15CHE203	Y	Y	Y	Y									Y	Y	Y
Instrumental Methods of Analysis	15CHY245	Y	Y	Y		Y								Y	Y	Y
Transforms and Partial Differential Equations	15MAT204	Y	Y	Y	Y								Y	Y	Y	Y
Fluid Mechanics Lab	15CHE281	Y	Y	Y	Y				Y	Y	Y			Y	Y	Y
Mechanical Operations Lab	15CHE282	Y	Y	Y	Y									Y	Y	Y
Chemical Engineering Thermodynamics	15CHE211	Y	Y	Y	Y									Y	Y	
Chemical Technology	15CHE212	Y	Y	Y	Y		Y	Y	Y			Y		Y	Y	Y
Process Heat Transfer	15CHE213	Y	Y	Y	Y			Y						Y	Y	Y
Chemical Engineering Instrumentation Lab	15CHE285	Y	Y			Y				Y	Y	1		Y	Y	Y
Chemical Technology Lab	15CHE286	Y	Y		Y	Y				Y	Y			Y	Y	Y
Chemical Reaction Engineering I	15CHE301	Y	Y	Y	Y									Y	Y	Y
Diffusional Mass Transfer Operations	15CHE302	Y	Y	Y	Y									Y	Y	Y

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Statics and Strength of Materials	15CHE303	Y	Y	Y	Y									Y	Y	Y
Environmental Science and Sustainability	15ENV300	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y
Probability and Statistics	15MAT214	Y	Y		Y										Y	Y
Heat Transfer Lab	15CHE381	Y	Y	Y					Y	Y	Y	Y		Y	Y	Y
Strength of Materials Lab	15CHE382	Y	Y	Y	Y					Y				Y	Y	Y
Project Based Learning - Phase I	15CHE391	Y	Y	Y	Y		Y	Y			Y			Y	Y	Y
Chemical Reaction Engineering II	15CHE311	Y	Y	Y	Y	Y								Y	Y	Y
Equilibrium Staged Operations	15CHE312	Y	Y	Y	Y					Y				Y	Y	
Materials Technology	15CHE313	Y	Y	Y	Y									Y	Y	Y
Process Dynamics and Control	15CHE314	Y	Y	Y	Y	Y	Y							Y	Y	Y
Numerical Methods	15MAT302	Y	Y	Y	Y	3								Y	Y	Y
Chemical Reaction Engineering Lab	15CHE385	Y	Y			Y				Y	Y			Y	Y	Y
Mass Transfer Lab	15CHE386	Y	Y	Y						Y	Y			Y	Y	
Project based Learning - Phase II	15CHE396	Y	Y	Y	Y	Y		Y			Y			Y	Y	Y

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Process Design and Integration	15CHE401	Y	Y	Y	Y	Y		Y						Y	Y	Y
Process Equipment Design and Drawing	15CHE402	Y	Y	Y			Y			Y				Y	Y	Y
Transport Phenomena	15CHE403	Y	Y	Y	Y					Y				Y	Y	
Chemical Process Control Lab	15CHE481	Y	Y		Y	Y				Y	Y			Y	Y	Y
Computer Aided Design Lab	15CHE482	Y	Y			Y		Y		Y				Y	Y	Y
Project Phase I	15CHE495	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Project Phase II	15CHE499	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Core Electives																
Biochemical Engineering	15CHE431	Y	Y	Y			Y	Y	Y	Y		Y		Y	Y	Y
Chemical Process Modelling and Simulation	15CHE432	Y	Y	Y	Y	Y	Y	Y		Y			Y	Y	Y	Y
Environmental Engineering for Process Industries	15CHE433	Y	Y	Y	Y		Y	Y	Y			Y		Y	Y	Y
Interfacial Science and Engineering	15CHE434	Y	Y	Y	Y	Y		Y						Y	Y	
Modern Separation Methods	15CHE436	Y	Y	Y		Y		Y						Y	Y	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Petroleum Refining & Petrochemicals Tech	15CHE438	Y	Y	Y	Y		Y	Y		Y				Y	Y	
Polymer Composites	15CHE439	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y
Materials Characterization and Spectroscopic Methods	15CHE435	Y	Y	Y	Y	Y		Y			Y		Y	Y	Y	Y
Nanoscience and Nanotechnology	15CHE437	Y	Y	Y	Y	Y								Y	Y	Y
Polymer Materials – Structure Property Relations	15CHE440	Y	Y	Y	Y	Y	Y	Y		Y			Y	Y	Y	Y
Polymer Processing	15CHE441	Y	Y			Y							Y	Y		Y
Process Intensification	15CHE443	Y	Y	Y	Y	Y	Y						Y	Y	Y	Y
Safety and Hazard Management in Chemical Industries	15CHE444	Y	Y	Y	Y			Y		Y				Y	Y	Y
Fundamentals of Management	15CHE470	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Managerial Economics and Accounting	15CHE471	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y			
Project Engineering of Process Plants	15CHE472	Y		Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y
Principles of Management and Accounting	15CHE473	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y			
Process Instrumentation	15CHE442	Y	Y	Y										Y	Y	Y
Solar Energy	15CHE445	Y	Y	Y	Y			Y		Y	Y					

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Science Electives																
Green Chemistry and Technology	15CHY244	Y	Y	Y		Y			Y					Y	Y	Y
Polymer Materials and Properties	15CHY250	Y	Y	Y				Y						Y	Y	
Modern Polymer Composites	15CHY247	Y	Y	Y			Y	Y						Y		Y
Instrumental Methods of Analysis	15CHY243	Y	Y	Y		Y								Y	Y	Y
Biomaterials Science	15CHY232	Y	Y	Y	Y				Y	Y	Y					
Humanities Electives																
Psychology for Engineers	15HUM240						Y	Y	Y	Y	Y	Y	Y			
Business Communication	15ENG230						Y			Y	Y	Y	Y			
Psychology for Effective Living	15HUM239						Y	Y	Y	Y	Y	Y	Y			
Understanding Science of Food and Nutrition	15HUM235		Y	Y			Y	Y	Y	Y	Y	Y	Y			
Soft Skills I	15SSK221		Y		Y				Y	Y	Y	Y	Y			
Soft Skills II	15SSK321		Y		Y					Y	Y	Y	Y			
Soft Skills III	15SSK331		Y		Y				Y	Y	Y		Y			

Table B.2.1.4.b Subject - PO - PSO mapping 2010 Regulation

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Communicative English	ENG111								Y	Y	Y		Y			
Physics	PHY100	Y	Y										Y			
Chemistry	CHY100	Y	Y	Y	Y											
Calculus, Matrix Algebra and ODE	MAT111	Y	Y													
Electrical Engineering	EEE100	Y	Y													
Engineering Mechanics	MEC100	Y	Y	Y	Y								Y			
Computer Programming	CSE100	Y	Y	Y										Y	Y	
Engineering Drawing	MEC181	Y	Y	Y	Y		Y				Y		Y	Y	Y	Y
Physics Lab	PHY181	Y	Y	Y	Y	Y	Y							Y	Y	
Chemistry Lab	CHY181	Y	Y	Y												
Workshop A	MEC180	Y	Y	Y		Y				Y	Y		Y	Y	Y	
Workshop B	EEE180	Y	Y	Y						Y			Y			
Computer Programming Lab	CSE180	Y	Y	Y		Y								Y	Y	
Technical Communication	ENG112								Y	Y	Y		Y			
Vector Calculus, Fourier Series and PDE	MAT112	Y	Y	Y									Y			
Electronics Engineering	ECE100	Y	Y	Y									Y	Y		

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Computer Aided Drawing	MEC182	Y	Y	Y	Y	Y	Y				Y		Y	Y	Y	Y
Integral Transforms and Complex Analysis	MAT211	Y	Y	Y												
Introduction to Chemical Engineering	CHE210	Y	Y	Y	Y									Y	Y	
Fluid Mechanics	CHE211	Y	Y	Y	Y									Y	Y	Y
Inorganic Chemical Technology	CHE220	Y	Y	Y	Y		Y	Y	Y			Y		Y	Y	Y
Inorganic and Physical Chemistry	CHE240	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y
Inorganic and Physical Chemistry Lab	CHE290	Y	Y	Y	Y	Y				Y			Y	Y	Y	Y
Fluid Mechanics Lab	CHE291	Y	Y	Y	Y				Y	Y	Y			Y	Y	Y
Mathematical Statistics & Numerical Methods	MAT212	Y	Y	Y												
Chemical Engineering Thermodynamics	CHE212	Y	Y	Y	Y									Y	Y	
Heat Transfer in Chemical Engineering	CHE213	Y	Y	Y	Y			Y						Y	Y	Y
Mechanical Operations	CHE221	Y	Y	Y	Y									Y	Y	Y

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Material Science and Strength of Materials	CHE241	Y	Y	Y	Y									Y	Y	Y
Strength of Materials Lab	CHE292	Y	Y	Y	Y					Y				Y	Y	Y
Mechanical Operations Lab	CHE293	Y	Y	Y	Y									Y	Y	Y
Diffusional Mass Transfer Operations	CHE310	Y	Y	Y	Y									Y	Y	Y
Chemical Reaction Engineering	CHE311	Y	Y	Y	Y	Y							Y	Y	Y	Y
Organic Chemical Technology	CHE320	Y	Y				Y	Y	Y					Y	Y	Y
Advanced Topics in Chemical Engineering	CHE330	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
Environmental Studies	ENV200	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y
Chemical Technology Lab	CHE390	Y	Y		Y	Y				Y	Y			Y	Y	Y
Heat Transfer Lab	CHE391	Y	Y	Y					Y	Y	Y	Y		Y	Y	Y
Equilibrium Staged Operations	CHE312	Y	Y	Y	Y					Y				Y	Y	
Computational Methods in Chemical Engineering	CHE313	Y	Y	Y	Y	Y								Y	Y	Y
Process Dynamics and Control	CHE331	Y	Y	Y	Y	Y	Y							Y	Y	Y

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Mass Transfer Lab	CHE392	Y	Y											Y	Y	
Chemical Reaction Engineering Lab	CHE393	Y	Y	Y										Y	Y	
Seminar	CHE397	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
Environmental Engineering for Process Industries	CHE400	Y	Y	Y	Y		Y	Y	Y			Y		Y	Y	Y
Transport Phenomena	CHE410	Y	Y	Y	Y					Y				Y	Y	
Process Equipment Design and Drawing	CHE430	Y	Y	Y			Y			Y				Y	Y	Y
Biochemistry and Molecular Biology	CHE440	Y	Y				Y	Y	Y					Y	Y	
Principles of Management	MNG400	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y			
Computer Aided Design Lab	CHE490	Y	Y			Y		Y		Y				Y	Y	Y
Chemical Process Control Lab	CHE491	Y	Y		Y	Y				Y	Y			Y	Y	Y
Project	CHE499	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Core Electives																
Modern Separation Methods	CHE351	Y	Y	Y		Y		Y						Y	Y	
Petroleum Refining & Petrochemical Tech	CHE352	Y	Y	Y	Y		Y	Y		Y				Y	Y	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Chemical Process Modeling and Simulation	CHE461	Y	Y	Y	Y	Y	Y	Y		Y			Y	Y	Y	Y
Interfacial Science and Engineering	CHE371	Y	Y	Y	Y	Y		Y						Y	Y	
Mgt and Economics of Chemical Process	CHE481	Y	Y	Y	Y			Y						Y	Y	Y
Polymer Materials and Rheology	CHE372	Y	Y	Y	Y	Y	Y	Y		Y			Y	Y	Y	Y
Nanoscience and Nanotechnology	CHE471	Y	Y	Y	Y									Y	Y	Y
IT Essentials	CSE380															
Science Electives																
Electrochemical Energy Systems and Processes	CHY271	Y	Y													
Green Chemistry and Technology	CHY264	Y	Y	Y		Y			Y					Y	Y	Y
Instrumental Method of Analysis	CHY259	Y	Y	Y		Y								Y	Y	Y
Chemistry of Engineering Materials	CHY251	Y	Y	Y		Y		Y				Y	Y	Y	Y	Y
Humanities Electives																
Business Communications	ENG251						Y			Y	Y	Y	Y			

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Understanding Science of Food and Nutrition	HUM259		Y	Y			Y	Y	Y	Y	Y	Y	Y			
Psychology for Engineers	HUM256						Y	Y	Y	Y	Y	Y	Y			
Indian Thoughts in English	ENG252						Y		Y				Y			
Psychology for Effective Living	HUM257						Y	Y	Y	Y	Y	Y	Y			
Soft Skills I	SSK111		Y		Y				Y	Y	Y		Y			
Soft Skills II	SSK112		Y		Y					Y	Y	Y	Y			
Soft Skills III	SSK113		Y		Y				Y	Y	Y		Y			
Cultural Education 1	CUL101						Y	Y	Y	Y	Y	Y	Y	Y	Y	
Cultural Education II	CUL102						Y	Y	Y	Y	Y	Y	Y	Y	Y	

The academic procedures for course delivery and assessment are based on CO-PO-PSO attainment measurements. To ensure compliance of the curriculum with CO-PO-PSO attainment, the student performance in all assessments is analysed for CO-PO-PSO attainments and all faculty are trained in measuring attainments. The department has an audit system for reviewing the attainments. The results are presented before the school-level review panel. The students give feedback on the course through class committees and online feedback systems. The feedback is used for initiating improvement plans in syllabi, curriculum, delivery, and infrastructure.

2.2. Teaching-Learning Processes (70)

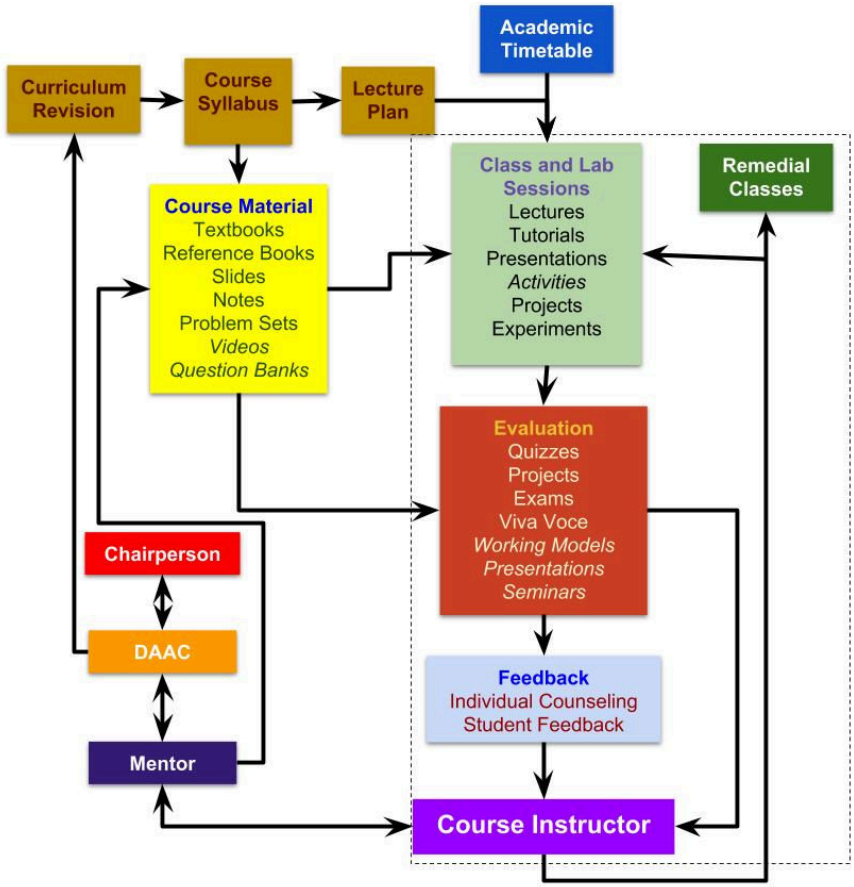


Figure B.2.2 Teaching Learning Process Schematic

The teaching learning process in the Chemical Engineering programme closely follows the course syllabus and the overall program curriculum as described in section B.2.1. At the start of the semester, Lecture Plans are developed by the Course Mentors to ensure effective delivery of the syllabus as per the Academic Timetable. The course material for each course includes standard textbooks and other learning material including notes, slides, videos, etc., which are shared with the students via the university's learning management system. Students also have access to the university's central library which is provided with world-class reference books and materials, and a repository of old question papers for ready reference.

In theory courses, the class sessions generally include: lectures, tutorials, presentation, activities, and project works. Several improved and innovative instructional methods are employed in delivering the theory sessions to enhance the teaching and learning experience (Table B.2.2.1).

Evaluation for lab courses is done individually, based on viva-voce, observation record, lab report, and final lab exam. Some of the labs encourage an open-lab mode, where the students can design their own experiment, conduct it, and publish the report. Additionally, instructors given projects that require development of demo models of equipment or instruments, in some lab courses.

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Evaluation

The evaluation of theory courses is done as per the scheme mentioned in Table 2.2a. Continuous Assessment consists of multiple assignments and quizzes conducted throughout the semester. Periodical 1 and Periodical 2 are centralized proctored examinations with partial portions. Continuous Assessment, Periodical 1 and Periodical 2 are treated as Internal Evaluation. The End Semester Exam is the final exam, which includes the entire syllabus for the course. It is also a proctored exam and is treated as the External Evaluation. The proportion of the Internal and External Evaluation components is 50:50 uniformly across all theory courses.

Table B.2.2a: Evaluation Scheme for Theory Courses

No	Evaluation Component	% Weightage
1	Continuous Assessment	20
2	Periodical 1	15
3	Periodical 2	15
4	End Semester Exam	50

The evaluation of theory courses is done as per the scheme mentioned in Table 2.2b. Continuous Assessment consists of the evaluation of multiple experiments conducted by students in different laboratory sessions throughout the semester and is considered as Internal Evaluation. The End Semester Exam involves students conducting a randomly-allotted experiment and its evaluation is treated as the External Evaluation. The proportion of the Internal and External Evaluation components is 80:20 uniformly across all laboratory courses.

Table B.2.2b: Evaluation Scheme for Laboratory Courses.

No	Evaluation Component	% Weightage
1	Continuous Assessment	80
2	End Semester Exam	20

2.2.1. Describe Processes followed to improve quality of Teaching & Learning (15)

There is a strong culture of excellence in the department and the department lays a strong emphasis on having a sound and constantly-improving teaching learning process. The department's greatest

strength is the highly qualified and committed faculty. Over 75 % (12 out of 16) of the faculty members are doctorates and of the rest, three are nearing the completion of their PhD (Table B.5.1). But the commitment of the faculty towards the students, the department and the university is beyond mere professional duties. Many are strongly committed to serving society in their professional and personal capacities, in keeping with the university's vision and mission. The 100% faculty retention (Table B.5.4) is reflective of this commitment. It is the competence and drive of the faculty members that ensures the constant improvement in the quality of the teaching learning process at CEMS.

The department has maintained a suitable student: faculty ratio of 12.83 (Table B.5.1) to enable faculty members to maintain high teaching standards. It enables the faculty members to implement various pedagogical initiatives, know students personally, and address their diverse needs. Teaching load is assigned to faculty members in compliance with AICTE norms, based on their interest and competence. Suitable concessions in the workload are made for faculty members who are pursuing their doctoral degrees, involved in research, and so on. Usually, the same courses are assigned to a faculty member for several semesters to enable faculty members to gain mastery on the course and progressively improve their delivery in each semester. Maintaining at least a 75% attendance is mandatory for all students to ensure that they actively participate in the learning process.

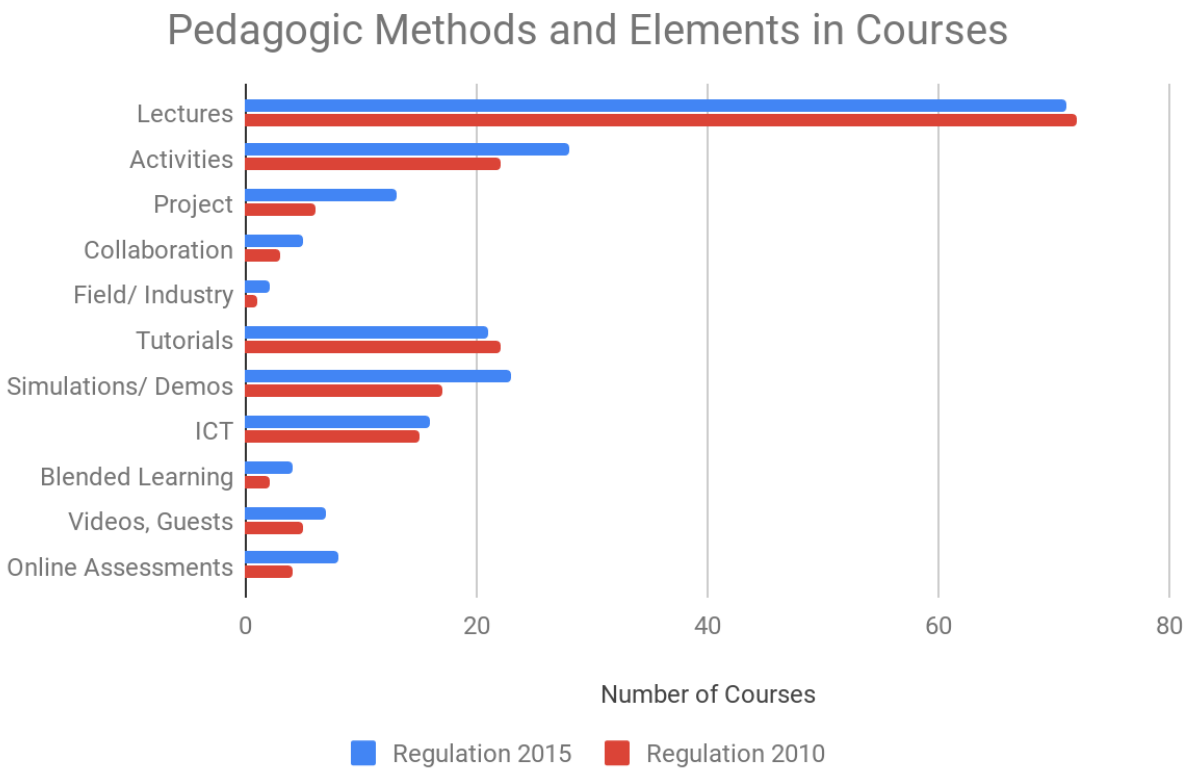


Figure 2.2.1a: Pedagogic Methods and Elements in Courses in the 2010 and 2015 Regulations

Various instructional methods are adopted by the faculty members in teaching the various courses, which are summarized in Figure 2.2.1a. The detailed list is provided in Table B.2.2.1. Apart from the conventional lecture mode of instruction, faculty members employ more modern and innovative instructional methods including class activities, projects, collaborative learning, project-based learning. tutorials, simulations, demonstrations, videos, guest lectures and field work or industry visits. All courses in the department are mandatorily administered via the Amrita Vishwa Vidyapeetham Management System, or AUMS. It includes course registration, attendance entry and reports, exam marks and grades, and an e-learning module. So, all courses involve at least a basic use of ICT tools. In many courses, professors also share course content including slides, videos, reading material, and so on, with students, via AUMS. Additionally, in some courses, professors are using online testing, blended learning, and other innovative learning methods in their courses.

2015 Regulation

Table B.2.2.1 a: Course-Wise List of Pedagogic Methods and Elements Adopted in Teaching in in the 2015 Regulation

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collabora	Field/	Tutorials	Simulatio	ICT	Blended	Videos,	Online
15ENG111	Communicative English	Y							Y			
15MAT111	Calculus and Matrix Algebra	Y							Y			
15CSE100	Computational thinking and Problem Solving	Y										
15CHY100	Chemistry	Y										
15CHY181	Chemistry Lab		Y					Y				
15MEC180	Workshop A		Y					Y				
15MEC100	Engineering Drawing - CAD	Y	Y					Y				
15CUL101	Cultural Education I	Y										Y
15MAT121	Vector Calculus and Ordinary Differential Equations	Y										
15PHY100	Physics	Y										
15CSE102	Computer Programming											
15CHE111	Introduction to Chemical Engineering	Y		Y								
15CHE112	Material Balances	Y	Y				Y		Y			
15PHY181	Physics Lab		Y					Y				

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collabora	Field/	Tutorials	Simulatio	ICT	Blended	Videos,	Online
15EEE180	Workshop B		Y					Y				
15CSE180	Computer Programming Lab		Y					Y				
15CUL111	Cultural Education II	Y										Y
15CHE201	Energy Balances and Thermodynamics	Y	Y				Y	Y				
15CHE202	Fluid Mechanics	Y	Y				Y	Y				
15CHE203	Mechanical Operations	Y					Y					
15CHY245	Instrumental Methods of Analysis	Y										
15MAT204	Transforms and Partial Differential Equations	Y										
	Humanities Elective I	Y										
15CHE281	Fluid Mechanics Lab	Y					Y	Y				
15CHE282	Mechanical Operations Lab		Y					Y				
15AVP201	Amrita Value Program I	Y	Y						Y		Y	Y
15CHE211	Chemical Engineering Thermodynamics	Y	Y				Y		Y			
15CHE212	Chemical Technology	Y					Y				Y	
15CHE213	Process Heat Transfer	Y	Y		Y			Y	Y			Y
	Science Elective	Y										
	Humanities Elective II	Y										
15CHE285	Chemical Engineering Instrumentation Lab		Y	Y				Y				
15CHE286	Chemical Technology Lab	Y					Y					
15SSK221	Soft Skills I	Y										
15AVP211	Amrita Value Program II	Y	Y						Y		Y	Y
15CHE301	Chemical Reaction Engineering I	Y		Y								
15CHE302	Diffusional Mass Transfer Operations	Y										
15CHE303	Statics and Strength of Materials	Y					Y		Y			
15ENV300	Environmental Science and Sustainability	Y	Y		Y				Y	Y	Y	Y
15MAT214	Probability and Statistics	Y	Y				Y		Y	Y		
15CHE381	Heat Transfer Lab	Y						Y				

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collabora	Field/	Tutorials	Simulatio	ICT	Blended	Videos,	Online
15CHE382	Strength of Materials Lab	Y						Y				
15CHE391	Project Based Learning - Phase I		Y	Y	Y							
15SSK321	Soft Skills II	Y										
15CHE390	Live-in-Lab	Y		Y		Y					Y	
15CHE311	Chemical Reaction Engineering II	Y		Y			Y					
15CHE312	Equilibrium Staged Operations	Y					Y		Y			
15CHE313	Materials Technology	Y					Y		Y			
15CHE314	Process Dynamics and Control	Y	Y	Y			Y	Y				
15MAT302	Numerical Methods	Y										
15CHE385	Chemical Reaction Engineering Lab		Y					Y				
15CHE386	Mass Transfer Lab	Y					Y	Y				
15CHE396	Project based Learning - Phase II		Y	Y	Y			Y				
15SSK331	Soft Skills III											
15CHE401	Process Design and Integration	Y	Y	Y			Y	Y				
15CHE402	Process Equipment Design and Drawing	Y					Y	Y				
15CHE403	Transport Phenomena	Y					Y		Y			
	Elective I	Y										
	Management Elective	Y										
15CHE481	Chemical ProcessControl Lab		Y					Y				
15CHE482	Computer Aided Design Lab		Y	Y				Y				
15CHE495	Project Phase I			Y								
15CHE490	Live-in-Lab		Y	Y		Y						
	Elective II	Y										
	Elective III	Y										
15CHE499	Project Phase II	Y										
ELECTIVES												
15CHY232	Biomaterials Science	Y	Y	Y	Y				Y	Y	Y	Y
15CHY244	Green Chemistry and Technology	Y										

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collabora	Field/	Tutorials	Simulatio	ICT	Blended	Videos,	Online
15CHE431	Biochemical Engineering	Y										
15CHE432	Chemical Process Modelling and Simulation	Y	Y						Y	Y		
15CHE433	Environmental Engineering for Process Industries	Y										
15CHE434	Interfacial Science and Engineering	Y										
15CHE435	Material Characterizationand Spectroscopic Methods	Y										
15CHE436	Modern Separation Methods	Y					Y					
15CHE437	Nanoscience and Nanotechnology	Y										
15CHE438	Petroleum Refining and Petrochemical Technology	Y					Y		Y			
15CHE439	Polymer Composites	Y										
15CHE440	Polymer Materials - Structure Property Relations	Y					Y					
15CHE441	Polymer Processing	Y										
15CHE442	Process Instrumentation	Y										
15CHE443	Process Intensification	Y										
15CHE444	Safety and Hazard Management in Chemical Industries	Y										
15CHE445	Solar Energy	Y	Y					Y			Y	Y
MANAGEMENT ELECTIVES												
15CHE470	Fundamentals of Management	Y										
15CHE471	Managerial Economics and Accounting	Y										
15CHE472	Project Engineering of Process Plants	Y										
15CHE473	Principles of Management & Accounting	Y										

Table B.2.2.1 b: Course-Wise List of Pedagogic Methods and Elements Adopted in Teaching in in the 2010 Regulation

2010 Regulation

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collaboration	Field/ Industry	Tutorials	Simulations/ Demos	ICT	Blended Learning	Videos, Guests	Online Assessments
ENG111	Communicative English	Y										
CHY100	Chemistry	Y										
MAT111	Calculus, Matrix Algebra and Ordinary Differential Equations	Y										
EEE100	Electrical Engineering	Y										
MEC100	Engineering Mechanics	Y										
MEC181	Engineering Drawing	Y	Y					Y				
CHY181	Chemistry Lab		Y					Y				
MEC180	Workshop A		Y					Y				
CUL101	Cultural Education I	Y										Y
ENG112	Technical Communication	Y	Y									
PHY100	Physics	Y										
MAT112	Vector Calculus, Fourier Series and Partial Differential Equations	Y										
ECE100	Electronics Engineering	Y										
CSE100	Computer Programing	Y	Y					Y				
MEC182	Computer Aided Drawing	Y	Y					Y				
PHY181	Physics Lab		Y					Y				
EEE180	Workshop B		Y					Y				
CSE180	Computer Programing Lab		Y					Y				
CUL101	Cultural Education II	Y										Y
MAT211	Integral Transforms and Complex Analysis	Y										
CHE210	Introduction to Chemical Engineering	Y	Y				Y		Y			

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collaboration	Field/ Industry	Tutorials	Simulations/ Demos	ICT	Blended Learning	Videos, Guests	Online Assessments
CHE211	Fluid Mechanics	Y					Y		Y			
CHE220	Inorganic Chemical Technology	Y					Y				Y	
CHE240	Inorganic and Physical Chemistry	Y					Y		Y			
	Humanities Elective I	Y										
CHE290	Inorganic and Physical Chemistry Lab	Y					Y					
CHE291	Fluid Mechanics Lab	Y					Y					
MAT212	Mathematical Statistics and Numerical methods	Y					Y		Y			
CHE212	Chemical Engineering Thermodynamics	Y	Y				Y					
CHE213	Heat Transfer in Chemical Engineering	Y	Y		Y			Y	Y			Y
CHE221	Mechanical Operations	Y					Y					
CHE241	Material Science and Strength of Materials	Y					Y		Y			
	Humanities Elective II											
CHE292	Strength of Materials Lab	Y					Y					
CHE293	Mechanical Operations Lab		Y					Y				
SSK111	Soft Skills I	Y										
CHE310	Diffusional Mass Transfer Operations	Y										
CHE311	Chemical Reaction Engineering	Y		Y					Y			
CHE320	Organic Chemical Technology	Y						Y			Y	
CHE330	Advanced Topics in Chemical Engineering	Y	Y	Y	Y	Y			Y			
	Science Elective I	Y										
ENV200	Environmental Studies	Y	Y	Y	Y				Y	Y	Y	Y
CHE390	Chemical Technology Lab	Y					Y					

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collaboration	Field/ Industry	Tutorials	Simulations/ Demos	ICT	Blended Learning	Videos, Guests	Online Assessments
CHE391	Heat Transfer Lab	Y						Y				
SSK 112	Soft Skills II	Y										
CHE312	Equilibrium Staged Operations	Y					Y		Y			
CHE313	Computational Methods in Chemical Engineering	Y										
CHE331	Process Dynamics and Control	Y		Y			Y	Y				
	Elective I	Y										
	Science Elective II	Y										
CHE392	Mass Transfer Lab	Y	Y				Y					
CHE393	Chemical Reaction Engineering Lab	Y						Y				
CHE397	Seminar		Y						Y			
SSK113	Soft Skills III	Y										
CHE400	Environmental Engineering for Process Industries	Y	Y				Y				Y	
CHE410	Transport Phenomena	Y					Y		Y			
CHE430	Process Equipment Design and Drawing	Y					Y					
CHE440	Biochemistry and Molecular Biology	Y						Y			Y	
	Elective II	Y										
MNG400	Principles of Management	Y										
CHE490	Computer - aided Design Lab		Y	Y				Y				
CHE491	Chemical Process Control Lab		Y					Y				
	Elective III	Y										
	Management Elective	Y										
CHE499	Project			Y								
ELECTIVES												
CHE351	Modern Separation Methods	Y					Y					

Course Code	Course Title	Pedagogic Methods										
		Lectures	Activities	Project	Collaboration	Field/ Industry	Tutorials	Simulations/ Demos	ICT	Blended Learning	Videos, Guests	Online Assessments
CHE352	Petroleum Refining and Petrochemical Technology	Y					Y		Y			
CHE353	Biochemical Engineering	Y										
CHE450	Paper Pulp and Fertilizer Technology	Y										
CHE451	Safety and Hazard Management in Chemical Industries	Y										
CHE452	Pharmaceutical Technology	Y										
CHE453	Food and Bioprocess Engineering	Y										
CHE454	Catalysis in Refining and Petrochemicals	Y										
CHE460	Molecular Modelling and Computational Chemistry	Y										
CHE461	Chemical Process Modelling and Simulation	Y	Y						Y	Y		
CHE462	Computational Methods in Fluid Dynamics	Y										
CHE371	Interfacial Science and Engineering	Y										
CHE372	Polymer Materials and Rheology	Y					Y		Y			
CHE373	Material Characterization and Spectroscopic Methods	Y										
CHE471	Nanoscience and Nanotechnology	Y										
MANAGEMENT ELECTIVES												
CHE480	Project Engineering of Process Plants	Y										
CHE481	Management and Economics of Chemical Processes	Y	Y				Y					
MEC353	Optimization Techniques in Engineering	Y										

Pedagogic methods adopted in laboratory sessions

For lab courses, the theoretical background is provided in prior semesters, or is delivered concurrently with (but prior to) the experiment. Highly experienced and well-trained lab staff are available to support the lab sessions, under the supervision of two faculty members designated as lab-in-charge. To the maximum extent possible, the experiments are conducted in such a way that each student gets an individualized experience in the practical learning process, while yet working in a team of two, to collaborate on experimental set up and troubleshooting.

Overcoming the deficiency in mathematical skills

An important weakness observed in the 2010 regulation was that a number of students were weak in their mathematical skills. One of the important reasons for the weakness was that in the first year mathematics courses, students were unable to relate how what they learned in the courses were applied to chemical engineering, which is the field of their choice. To overcome this problem, the department decided to allocate department-faculty to teach the first year mathematics courses, instead of faculty members from the mathematics department. This way, additional emphasis could be placed on strengthening their skills particularly in understanding and applying those concepts/techniques often encountered in chemical engineering courses. This has resulted in favorable feedback from students and alumni.

Undergraduate students are provided with opportunities to work on research projects under the guidance of faculty members. Student-involvement in research advances their knowledge, skills and competence, and improves their motivation for learning due to a better appreciation for the practical application of learned concepts.

The recently-introduced Live-in-Labs® open elective allows students a one-of-a-kind experience of solving real world problems of rural India. Amrita Live-in-Labs® is a multidisciplinary experiential learning program that facilitates the research, development, and deployment of sustainable solutions for current challenges faced by rural communities in India. The program allows participants to study, observe, and interact with rural populations while living in rural communities.

Feedback and Counselling

Student feedback on the teaching-learning process is taken at various levels. Being a small department, the students and the faculty members know each other quite well. Students are usually comfortable in asking questions to teachers and expressing their opinions openly in class. Many students also regularly approach teachers in their offices to clarify doubts, learn more, discuss about their future career options and occasionally for advice on personal issues. During the first few weeks of teaching any class, teachers, informally identify the brighter and the less attentive students. They take efforts to include the less attentive students in the class discussions and activities. Student performance on class quizzes and assignments further helps identify weaker

students. After Periodical 1, which comes roughly one month after the commencement of the semester, the weaker students are identified and counselled by the teachers. Other interventions such as giving additional assignments, conducting remedial classes and so on are also adopted by the teachers as required. Apart from this feedback and counselling done by the teachers in their individual capacity, there is a formal process as depicted in Figure 2.2.1.

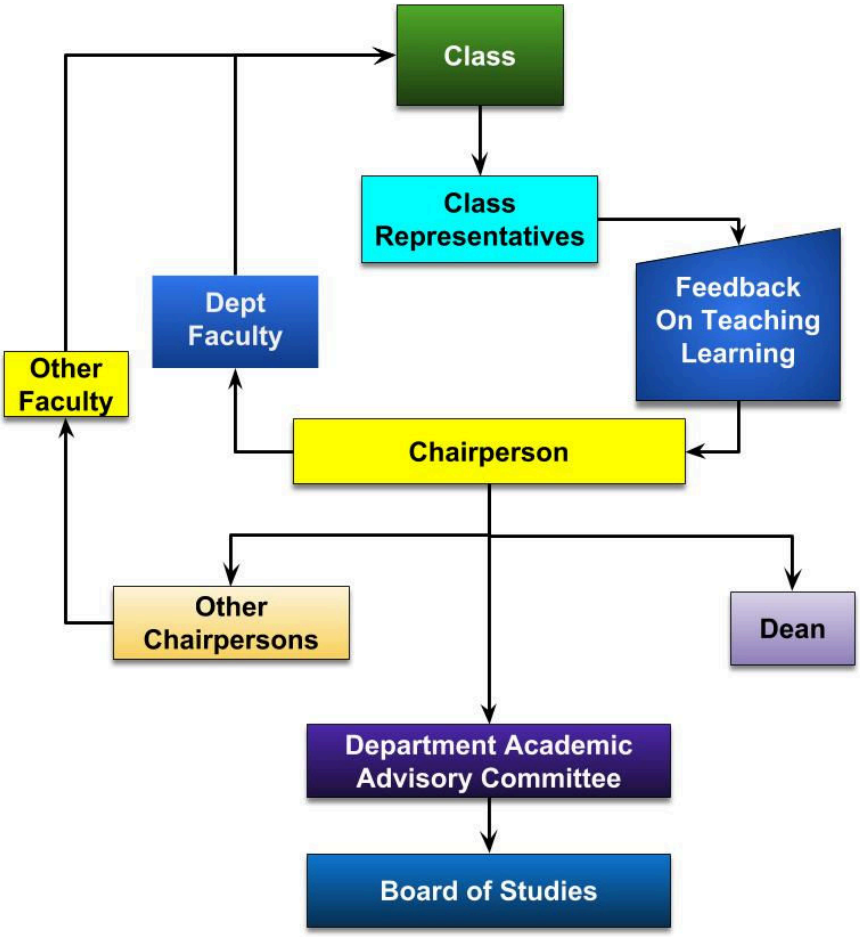


Figure 2.2.1: Student feedback on the teaching learning process

Class Committee Meetings are convened by the chairperson, in which the class representatives share their concerns and unresolved issues. Depending on the nature of the issues, the chairperson takes the necessary action which may include communication to the concerned faculty member. In case the faculty member belongs to another department, the communication is routed through the chairperson of that department. The teaching faculty member takes the necessary remedial action. Matters related to the syllabus and curriculum are brought to the attention of the Department Academic Advisory Committee, which in turn assesses the issue and proposes changes during the next Board of Studies meeting. Other sensitive issues or issues beyond the purview of the department are brought to the attention of the Dean (Eng.).

This fairly robust and effective feedback and counselling system has allowed the department to have very low failure and dropout rates (see Section B.4b and B.4c) in spite of maintaining high standards in the evaluation and grading process. Another indicator for the success of the departmental counselling is the high numbers of students going for higher studies. The faculty, through their teaching, are able to motivate students to further enhance their knowledge in the field. Students seek advice from the department faculty members regarding their career, higher studies, competitive examinations, and so on. The department faculty members willingly support them in various ways including providing letters of recommendation for deserving students.

All department faculty members are involved in research and are regularly publishing in peer reviewed journals (Table B.5.8.1). Many are working on funded research projects (Table B.5.8.2). Faculty involvement in research improves their competence in their field and keep them updated on the new developments in the field. It also provides opportunities for students to participate in research. Faculty members are also participating in and conducting workshops and faculty development programs. They are also giving invited talks in reputed academic, government and industrial organizations, which contribute to their professional development (Tables B.5.6 and B.5.7).

To support the department's efforts to achieve academic excellence, the university provides sufficient classrooms and laboratories for use by the department. All classes have blackboards and LCD projectors. Select classes have audio facilities for screening videos. Classrooms with appropriate facilities are allocated for various subjects. The seating in the classrooms is flexible. Movable desks and light chairs easily allow changing the arrangements for classroom activities such as group discussions. Fully-equipped seminar halls can be used for guest lectures and seminars. The department has well-maintained laboratories having sufficient equipment and facilities (Table B.6.1) and adequate and competent laboratory staff. The university's central library has sufficient textbooks, reference books, journals and magazines related to chemical engineering. Additionally, the department also has a departmental library, with some books, archives of project reports and published research articles. The faculty feedback matrix is provided in Table B 9.2.

2.2.2. Quality of end semester examination, internal semester question papers, assignments and evaluation (15)

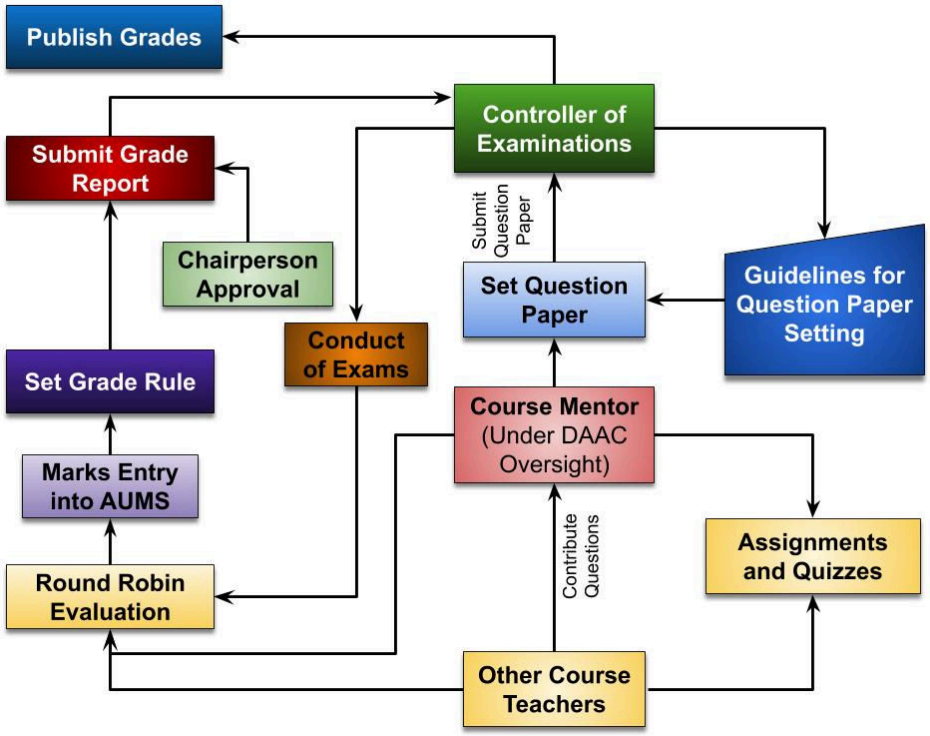


Figure 2.2.2a: Process for question paper setting and evaluation

Figure 2.2.2 depicts the process for setting question papers and evaluation. Question papers for Periodical 1, Periodical 2 and End Semester exams, are set by the course mentors in accordance with the guidelines from the Controller of examinations. Following are the general guidelines followed in setting the question papers:

- Question papers have two sections:
    - Section A must have objective type questions, of 2-4 marks each. This section can cover basic conceptual, definitional, notational, factual, and descriptive questions.
    - Section B can have longer descriptive, problem solving, analytical, derivational, design, and visual (drawing) questions.
- No single question must carry more than 10 marks. In Section B, even if a question has parts (a), (b), (c), etc., the total marks for that question should not exceed 10.
- 30% of the questions (as measured by the weight of marks) must be selected at a basic level, reasonably based all levels of students being able to answer them. 50% of the questions are to be set at a moderate level of difficulty, and the remaining 20% at a higher level of difficulty.
- Some questions from GATE Chemical Engineering Question Papers are commonly included in the question papers.

- Question papers are reviewed for correct spelling, grammar, required data, and formatting.

Since the Chemical Engineering and Materials Science Department has only one section for each year, the teacher of most courses is also usually the course mentor. For common courses taught in multiple sections across departments, there are multiple teachers teaching each course and the course mentor seeks contributions of questions from different teachers in order to prepare the question paper. The mentor ensures that the questions are suitably distributed across the COs, Blooms taxonomy levels, topics in the portions and levels of difficulty. Questions for internal assignments and quizzes are set by the course teachers and the course mentor. Reports describing these distributions for various exams conducted in each course are available on Inpods.

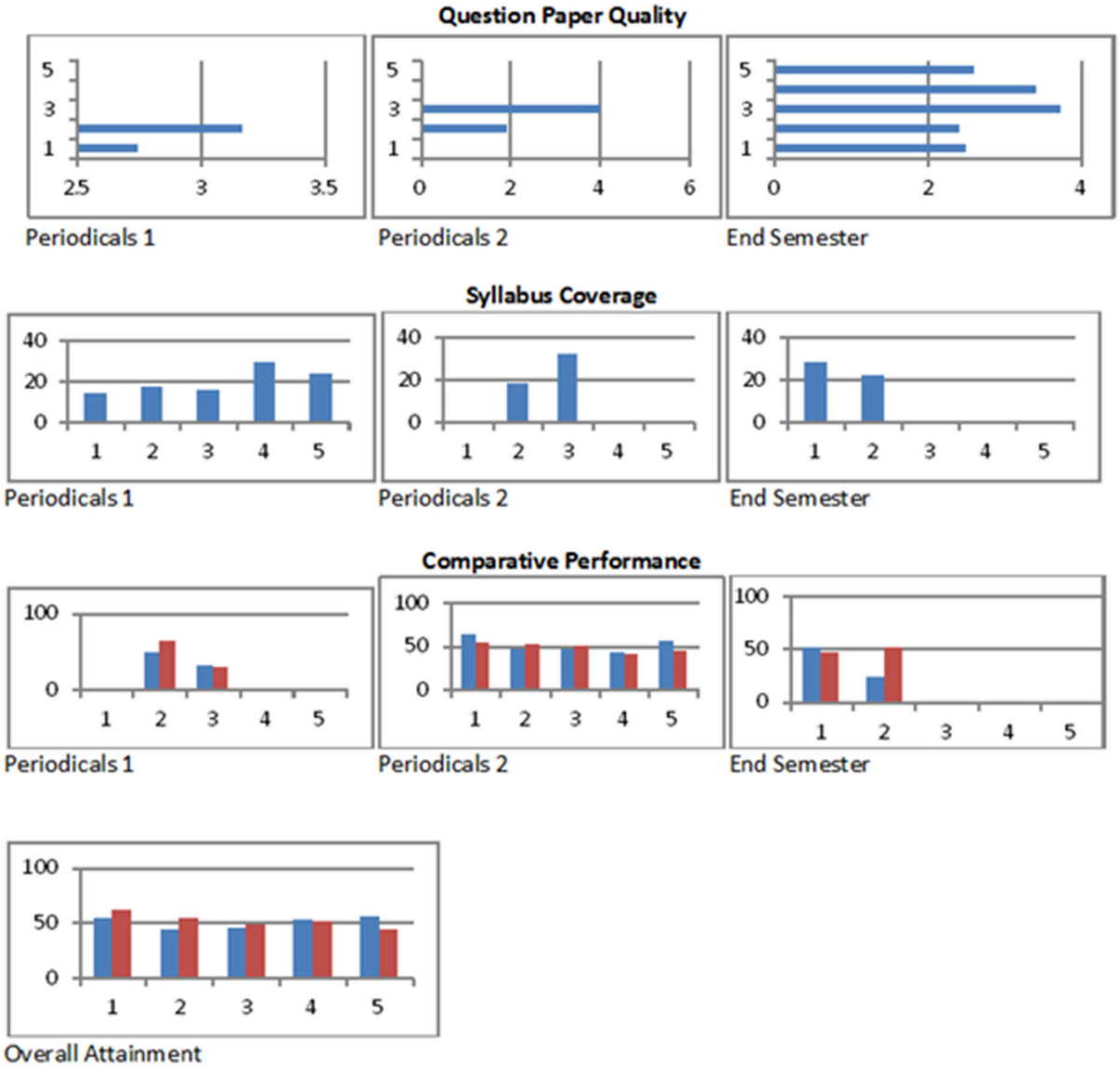


Figure 2.2.2b: Screenshots from Inpods

High standards of confidentiality are maintained in the examination process. Two sets of question papers are submitted by the course mentor and the Controller of Exams selects any one. Examinations are conducted with strict invigilation done by faculty members only. Staff and research scholars are not permitted to invigilate exams. After the exams, the evaluation is carried out by the teachers in the evaluation halls. In order to maintain uniformity in evaluation across multiple sections in common courses, evaluation is done in evaluation halls in a round-robin fashion. In courses taught by a single teacher (course mentor), the evaluation is done by the same teacher. Teachers enter the marks into AUMS. The course mentor convenes a grade meeting in which a grade rule suitable for the various sections of the course is set by mutual consent of the teachers teaching the course. The individuals accordingly prepare the grade report, which is approved by the course mentor and the chairperson and submitted to the Controller of Examinations. For students who apply to the Office of the Controller of Examinations, re-evaluation of their answer-sheets is carried out and their marks and grades revised as required.

2.2.3. Quality of student projects (20)

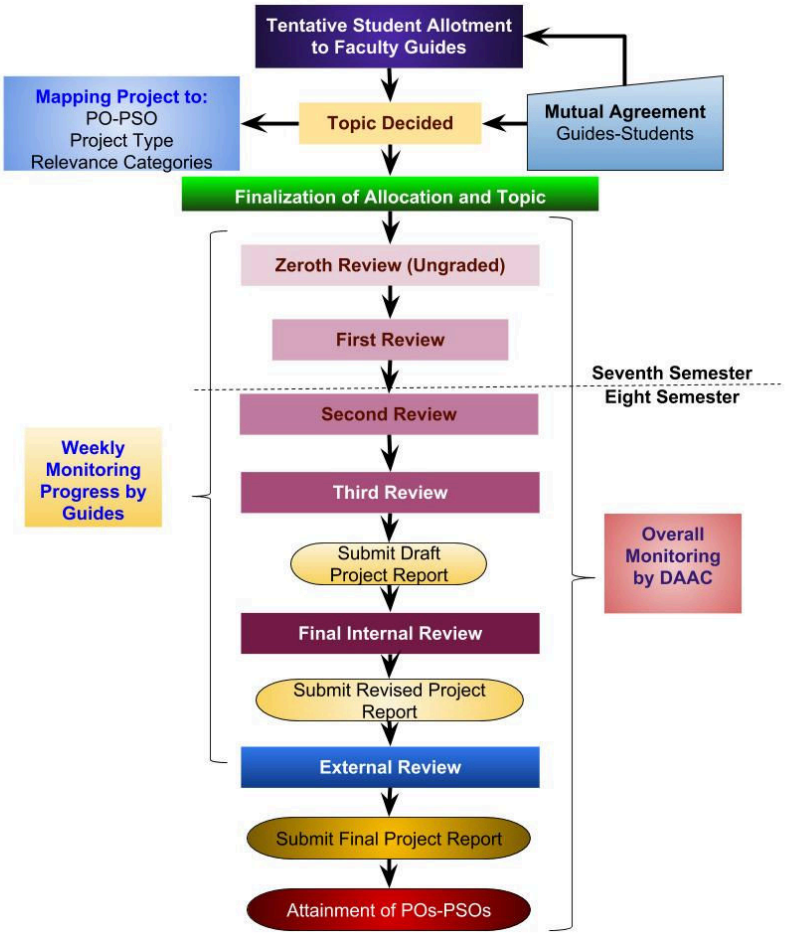


Figure B.2.2.3: Process for the management of final year projects

CHE499 Project

CO Code	Course outcome statement
CHE499.1	Create a set up through proper design and investigate the system using the engineering knowledge acquired
CHE499.2	Estimate and manage the cost and time of the project
CHE499.3	Present the project with clarity and ethics in both oral and written mode
CHE499.4	Develop a team and effectively participate in the team to execute the project
CHE499.5	Support the environmental , social and engineering discipline through the project

Course Articulation Matrix

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CHE499.1	3	3	3	3	3								3	3	3
CHE499.2											3		3	3	
CHE499.3								3	3	3			3		3
CHE499.4									3				3		3
CHE499.5						3	3					3	3		3

The internal review project evaluation guidelines:

Criteria	Linked CO	Linked PO	Max. Marks
Communication	CO3	PO10	10
Project progress/Implementation	CO1	PO2, PO3, PO4	15
Report	CO3, CO4	PO8, PO9	5
Basic understanding	CO1	PO1	15
Guide	CO3, CO5	PO8, PO9, PO12	15
			60

The external review project evaluation guidelines:

Criteria	Linked CO	Linked PO	Max. Marks
Basic understanding	CO1	PO1	5
Project implementation	CO1	PO2, PO3, PO4	10
Skill	CO5	PO5	5
Project management	CO2	PO11	5
Social responsibility/Novelty	CO5	PO6, PO7	5
Report	CO3, CO4	PO8, PO9	5
Comprehension	CO5	PO12	5
			40

Table 2.2.3. List of UG students participating in research projects

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
1	2017-2018	M. Arjun	Surfactant-assisted synthesis of metallic cadmium, cadmium hydroxide nanostructures and their electrochemical charge storage properties	Dr. Duraisamy Kumaresan	completed	Journal publication (Dalton Transactions)
2	2017-18	T. Mohan	Titanium Nitride Blended Graphene Nanoplatelets as Low-cost and Efficient Composite Counter Electrode for Dye-sensitized Solar Cells	Dr. Duraisamy Kumaresan	completed	IEEE conference publication (IEEE International Conference on System, Computation, Automation and Networking)
3	2015-16	Dileep V Raj	Fabrication of low-cost carbon paste based counter electrodes for dye-sensitized solar cells	Dr. Duraisamy Kumaresan	completed	IEEE conference publication (IEEE-International Conference on Electrical, Electronics, and Optimization Techniques)
4	2014-15	Anagha Asok, L Pavithra, Kavya Menon, PVSS Dharma Teja	Portable infrared carbon dioxide detector for monitoring vehicular emissions	Dr. Duraisamy Kumaresan	completed	IEEE conference publication (Industrial Instrumentation and Control (ICIC))
5	2013-14	A Nikhil, DA Thomas, S Amulya	Synthesis, characterization, and	Dr. Duraisamy Kumaresan	completed	Journal publication

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
			comparative study of CdSe–TiO2 nanowires and CdSe–TiO2 nanoparticles			(Solar Energy)
6	2015-16	M. Dhinesh Kumar, S. Srikaanth	Effects of Additives on Kinetics and Morphologies of Electrodeposited Bismuth Films	Murali Rangarajan	completed	Journal publication (Journal of Physical Chemistry C)
7	2014-15	Aaditya Hari B., Mohammed Muzwar Pushkala Venkatesh	Kinetics of Fischer-Tropsch Synthesis in a Fixed-bed Reactor	Dr. Udaya Bhaskar Reddy Ragula	completed	American Institute of Chemical Engineers (AIChE) Annual Meeting 2018
8	2017-2018	A. Arun Shankar, Prudhvi Raj Pentapati	Biodiesel synthesis from Cottonseed oil using homogeneous alkali catalyst and using heterogeneous multi walled carbon nanotubes: Characterization and Blending Studies	Dr. R. Krishna Prasad	Completed	A. Arun Shankar, Prudhvi Raj Pentapati, R. Krishna Prasad, Biodiesel synthesis from Cottonseed oil using homogeneous alkali catalyst and using heterogeneous multi walled carbon nanotubes:

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
						Characterization and Blending Studies, Egyptian Journal of Petroleum, 26 (2017) 125-133. doi.org/10.1016/j.ejpe.2016.04.001
9	2017-2018	M. Shobana	Kinetics and characterization of transesterification of cottonseed oil to biodiesel using calcined clam shells as catalyst	Dr. R. Krishna Prasad	Completed	M. Shobana, R. Krishna Prasad, Udaya Bhaskar Reddy Ragula, Duraisamy Kumaresan, Kinetics and characterization of transesterification of cottonseed oil to biodiesel using calcined clam shells as catalyst, Biofuels, DOI: 10.1080/17597269.20

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
						17.1378994.
10	2017-2018	V.Aarathi, E. Harshita, Atira Nalinashan, Sidharrthh Ashok	Synthesis and Characterization of Rubber Seed Oil Trans-esterified Biodiesel Using Cement Clinker Catalysts	Dr. R. Krishna Prasad	Completed	V.Aarathi, E. Harshita, Atira Nalinashan, Sidharrthh Ashok, R. Krishna Prasad, Synthesis and Characterization of Rubber Seed Oil Trans-esterified Biodiesel Using Cement Clinker Catalysts, International Journal of Sustainable Energy, DOI: 10.1080/14786451.2017.1414052
11	2017-2018	R Keshav Johar, G. Saravanakumar	Kinetics and Sub Sieve Morphology of Ball Mill	Dr. R. Krishna Prasad	Completed	R Keshav Johar, G. Saravanakumar, R. Krishna Prasad,

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
			Grinding for different grades of Indian coals			Kinetics and Sub Sieve Morphology of Ball Mill Grinding for different grades of Indian coals, International Journal of Oil, Gas and Coal Technology, 17 (4) (2018) 458 - 471. doi.org/10.1504/IJOGCT.2018.090967
12	2016-2017	C.S. Sridhar, P. Sabareesh Sankar	Grinding Kinetics, Modeling and Sub Sieve Morphology of Ball Mill Grinding for Cement Industry Ingredients	Dr. R. Krishna Prasad	Completed	C.S. Sridhar, P. Sabareesh Sankar, R. Krishna Prasad, Grinding Kinetics, Modeling and Sub Sieve Morphology of Ball Mill Grinding for Cement Industry

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
						Ingredients, Particulate Science and Technology, 34 (1) (2016) 1 - 8. DOI: 10.1080/02726351.2015.1027838
13	2016-2017	Nitin Sankar, Mamilla Nagarjun Reddy	Carbon Nanotubes Dispersed Polymer Nanocomposites: Mechanical, Electrical, Thermal Properties and Surface Morphology	Dr. R. Krishna Prasad	Completed	Nitin Sankar, Mamilla Nagarjun Reddy, R. Krishna Prasad, Carbon Nanotubes Dispersed Polymer Nanocomposites: Mechanical, Electrical, Thermal Properties and Surface Morphology, Bulletin of Materials Sciences, 39(1) (2016) 47 – 55.

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
						doi.org/10.1007/s1203
14	2016-2017	D. Aravind	Film Pore Diffusion Modeling and Contact Time Optimization for Sorption of Distillery Spentwash on Fly ash	Dr. R. Krishna Prasad	Completed	D. Aravind, R. Krishna Prasad, Film Pore Diffusion Modeling and Contact Time Optimization for Sorption of Distillery Spentwash on Fly ash, Desalination and Water Treatment, 57(52) (2016) 24925-24933. doi.org/10.1080/19443994.2016.1143878
15	2016-2017	P. Sabareesh Sankar	Simulation of Fly ash Particulates Separation in Cyclone Separator	Dr. R. Krishna Prasad	Completed	P. Sabareesh Sankar, R. Krishna Prasad, Simulation of Fly ash Particulates Separation in Cyclone Separator,

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
						International Journal of Environmental Technology and Management, 19(3) (2016) 288 - 300. doi.org/10.1504/IJETM.2016.082255
16	2015-2016	Nisha Subash	Kinetics and Mass Transfer Models for Sorption of Titanium Industry Effluent in Activated Carbon	Dr. R. Krishna Prasad	Completed	Nisha Subash, R. Krishna Prasad, Kinetics and Mass Transfer Models for Sorption of Titanium Industry Effluent in Activated Carbon, Desalination and Water Treatment, 57(16) (2016) 7254 – 7261. doi.org/10.1080/19443994.2015.1016458

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
17	2015-2016	P. Sabareesh Sankar	Process Modeling and Particle Flow Simulation of Sand Separation in Cyclone Separator	Dr. R. Krishna Prasad	Completed	P. Sabareesh Sankar, R. Krishna Prasad, Process Modeling and Particle Flow Simulation of Sand Separation in Cyclone Separator, Particulate Science and Technology, 33(4) (2015) 385 - 392. doi.org/10.1080/02726351.2014.978426
18	2015-2016	Nikhil Rajeev	Process Simulation and Modeling of Fluidized Catalytic Cracker Performance in Crude Refinery	Dr. R. Krishna Prasad & Dr. Udaya Bhaskar	Completed	Nikhil Rajeev, R. Krishna Prasad, Udaya Bhaskar Reddy Ragula, Process Simulation and Modeling of Fluidized Catalytic

List of UG students participating in research projects						
No.	**Academic year**	**Name of the student**	**Title/topic of the research work**	**Mentor/s**	**Status**	**Outcomes (publication)***
						Cracker Performance in Crude Refinery, Petroleum Science and Technology, 33(1) (2015) 110-117. doi.org/10.1080/10916466.2014.953684

2.2.4. Initiatives related to industry interaction (10)

The university has a vibrant culture of academic and research excellence. The department of chemical engineering, which is at the forefront of these activities, has numerous visitors from national and international academic institutes and industry every year. Among them, the guest lectures and invited talks directly benefit students. Some other visitors are invited for the purpose of the reviews and external examinations of doctoral and postgraduate students. These visits contribute to the culture of academic excellence, enriching the faculty and the doctoral students. Some visits are related to research and consultancy interactions strongly contribute to the the university's research excellence and reputation. In addition to the above, Tables B.5.8.2 and B.5.8.4 list the various research and consultancy projects in which the department faculty are involved. All these activities indirectly enrich the undergraduate program.

Table B.2.2.4: Department Visitors for Invited Talks, Research Interactions, Consultancy and Other Purposes

S.No	Year	Date	Guest Name	Guest Affiliation	Faculty Name	Purpose/ Topic of Interaction	Student Participation
1	2015	19.02.15	Dr. Sushil Kumar	Reliance industries, President	Prof. R. Subba Rao, HOD, Chemical	An overview of petrochemical industry	Yes
2	2015	23.02.15	Mr. Godfay	TA Instruments, Bangalore	Mr. R. Senthilkumar, COE AMGT	Equipment installation/maintenance	No
3	2015	19.05.15	Prof. Anantharaman	NIT - Trichy, Professor	Prof. R. Subba Rao, HOD, Chemical	Board of studies meeting	No
4	2015	18.05.15	Prof. Sachin Patwardhan	IIT-Bombay, HOD	Prof. R. Subba Rao, HOD, Chemical	Board of studies meeting	No
5	2015	12.05.15	Mr. Haga & his colleage	TORAY - Japan	Prof. R. Subba Rao, HOD, Chemical	Carbon fiber composites	Yes
6	2015	22.05.15	Dr. Vijay Petuy	DRDO-GTRE, Scientist	Prof. R. Subba Rao, HOD, Chemical	Metal matrix composites	Yes
7	2015	20.07.15	Dr. Praveen C Ramamoorthy	IISC, Bangalore, Professor - IISC	Dean. PGP, Dr. Nikhil Kothurkar	PhD External Examination	No
8	2015	14.09.15	Dr. S Faizi	Chairman of the Indian Biodiversity Forum and member of the Board in the CBD Alliance world wide	Dr. P.P Nikhil Raj	Sustainable Development-the emerging paradigm	Yes
9	2015	21..12.15	Dr. Dinesh Agrawal,	Pennsylvania State University, USA, Professor of Engineering Science & Mechanicas & Director of Microwave Processing & Engineering Center,	Dr. Sriram, Head, COE-AMGT	Research interaction	No

S.No	Year	Date	Guest Name	Guest Affiliation	Faculty Name	Purpose/ Topic of Interaction	Student Participation
10	2015	5.11.15	Mr. Ashok Bendale & Mr. Vikas Kakad, Service Engineers,	(M/s Aasabi Machinery Pvt. Ltd.,)	Dr. K Jayanarayanan		
11	2015	7.11.15	Dr. S. Anandan	Assocaite Professor, NIT-Trichy	Dr. Durisamy Kumaresan	PhD review Meeting	No
12	2015	25.11.15	Mr. Nagendra Palil and Mr. Kaushtush	Bharaj Machineries, Service Engineers	Prof. R. Subba Rao, HOD, Chemical	2 Roll mill and compression press	No
13	2016	10.03.16	Mr. Sadasivam	Toshivin Analytical Instrument, Regional Manager	R. Senthilkumar, COE-AMGT	Equipment installation/maintenance	No
14	2016	22.03.16	Dr. R. V. Subba Rao	IGCAR, Scientists	Prof. R. Subba Rao, HOD, Chemical	Physical Chemistry	Yes
15	2016	02.04.16	Dr. Velmurugan	IIT Madras, Professor	Dr. Nikhil Kothurkar	PhD review Meeting	No
16	2016	10.06.16	Dr. Subbiah Alwarappan	CSIR-CECRI, Senior Scientist	Dr. Murali Rangarajan	Electrochemical Sensors	
17	2016	16.06.16	Dr. Sathishkumar Jothi	Swansea University, UK	Dr. Murali Rangarajan	Grain Boundary Engineering	Yes
18	2016	10.06.16	Dr. Sathishkumar Jothi	Swansea University, UK, Asst. Professor	Dr. Murali Rangarajan	Electrochemical Crystal Growth	Yes
19	2016	24.07.16	Dr. Sesha Srinivasan	Florida Polytech, USA, Assistant Prof.	Dr. Nikhil Kothurkar	Invited Talk and Research Interaction	Yes
20	2016	15.10.16	Dr. R. V. Subba Rao	IGCAR, Kalpakkam, Superintendent Reprocessing Plant Scientist, Operator	Dr. Meera Balachandran	Invited Talk - Nuclear Reprocessing	Yes

S.No	Year	Date	Guest Name	Guest Affiliation	Faculty Name	Purpose/ Topic of Interaction	Student Participation
21	2016	26.10.16	Dr. S. Sakthivel	ABC, Hydrabad, Scientist - E	Dr. Sriram, Head, COE-AMGT	Research Interaction	No
22	2016	20.11.16	Dr. Neel & Mr. Gurunathan	USA	Prof. R. Subba Rao, HOD, Chemical	Chemical Reaction Engineering	Yes
23	2017	03.01.17	Mr. Gowder	I R Tech, Bangalore, Sr. Engineer	Mr. R. Senthilkumar, COE AMGT	Equipment installation/maintenance	No
24	2017	02.03.17	Dr. K. A. Venkatesan, Dr. EVS Ashok Kumar	IGCAR, I Chief Scientists	Prof. R. Subba Rao, HOD, Chemical	Radio Chemistry	No
25	2017	29.03.17	Prof. Jeremy Simpson & Prof. Thampi	UCD Dublin, Professor	Dr. Sriram, Head, COE-AMGT	Research Interaction	No
26	2017	17.02.17	Sri Sushil kumar,	Reliance industries, President	Prof. R. Subba Rao, HOD, Chemical	Petroleum industry	Yes
27	2017	27.02.17	Mr. Jain Upadhaya	Techloss India, MD	Dr. Udaya Bhaskar Reddy Ragula		
28	2017	21.04.17	Dr. R. V. Subba Rao	IGCAR, Division Head, IGCAR	Dr. Meera Balachandran	UGC - DAE CSR Project discussion	No
29	2017	8.05.17	Dr. Raja	NCL, Pune, Scientist	Dr. D. Kumaresan	Project consultancy meeting	No
30	2017	15.05.17	Ms. Hemalatha Annamalai, Mr. Pachayappa Baladhandayuthapani, Mr. S. Karthik	CEO, CTO and Manager - R & D, Ampere Electric Vehicles Ltd, Coimbatore	Dr. Madhav Datta, Dr. Murali Rangarajan, Dr. Thirugnasambandam G. M., Dr. Udaya Bhaskar Reddy Ragula, Dr. K. K. Sasi, Dr. A. Vijayakumari, Dr. Sudip Kumar Batabyal	Consultancy Project	No

S.No	Year	Date	Guest Name	Guest Affiliation	Faculty Name	Purpose/ Topic of Interaction	Student Participation
31	2017	26.05.17	Ms. Hemalatha Annamalai, Mr. Pachayappa Baladhandayuthapani, Mr. S. Karthik	CEO, CTO and Manager - R & D, Ampere Electric Vehicles Ltd, Coimbatore	Dr. Madhav Datta (CEMS and ACIRI), Dr. Murali Rangarajan, Dr. Thirugnasambandam G. M., Dr. Udaya Bhaskar Reddy Ragula, Dr. K. K. Sasi (EEE), Dr. A. Vijayakumari (EEE), Dr. Sudip Kumar Batabyal (ACIRI)	Consultancy Project	No
32	2017	07.06.17	Ms. Hemalatha Annamalai, Mr. Pachayappa Baladhandayuthapani, Mr. S. Karthik	CEO, CTO and Manager - R & D, Ampere Electric Vehicles Ltd, Coimbatore	Dr. Madhav Datta (CEMS and ACIRI), Dr. Murali Rangarajan, Dr. Thirugnasambandam G. M., Dr. Udaya Bhaskar Reddy Ragula, Dr. K. K. Sasi (EEE), Dr. A. Vijayakumari (EEE), Dr. Sudip Kumar Batabyal (ACIRI), Dr. Sasangan Ramanathan	Consultancy Project	No
33	2017	16.06.17	Mr. Pachayappa Baladhandayuthapani, Mr. S. Karthik	CTO and Manager - R & D, Ampere Electric Vehicles Ltd, Coimbatore	Dr. Madhav Datta (CEMS and ACIRI), Dr. Murali Rangarajan, Dr. Thirugnasambandam G. M., Dr. Udaya Bhaskar Reddy Ragula, Dr. K. K. Sasi (EEE), Dr. A. Vijayakumari (EEE), Dr. Sudip Kumar Batabyal (ACIRI)	Consultancy Project	No

S.No	Year	Date	Guest Name	Guest Affiliation	Faculty Name	Purpose/ Topic of Interaction	Student Participation
34	2017	22.06.17	Dr. Subbiah Alwarappan	CSIR-CECRI, Senior Scientist	Dr. Murali Rangarajan	MoS2-based Electrochemical Sensors	Yes
35	2017	05.07.17	Dr. Kaushik Jayasayee	SINIEF, Norway, Research Scientist	Dr. Thirugnasambandam	Photoelectrochemcial water splitting	Yes
36	2017	05.07.17	Dr. Suresh kannan	Dept. & Matsci & Eng, Researcher	Dr. Thirugnasambandam		
37	2017	13.07.17	Dr. S. Anandan	NIT - Trichy, Assocate Professor	Dr. D. Kumaresan	Phd review meeting	No
38	2017	10.09.17	Dr. K. Kalyansundaram	EPFL, Switzerland, Research Scientist	Dr. D. Kumaresan	Workshop	Yes
39	2017	11.10.17	R Sadasivam	Toshvin Analytical, Service Head	Mr. R. Senthilkumar, COE AMGT	Equipment installation/maintenance	No
40	2017	23.10.17	Dr. Anup Kumar Ghosh	IIT, Delhi, Professor	Dr. K Jayanarayanan		
41	2017	27.10.17	Dr. Kaustav Bhowmick, Dr. Veeresh Kumar,	ASE, Bangalore, Asst. Professor	Dr. Sriram, Head, COE-AMGT	Research Interaction	No
42	2017	11.12.17	Dr. Vaidyanathan Pallavoor	UCF-USA, Professor	Dr. Nikhil Kothurkar	Academic and Research Interaction	Yes
43	2018	11.01.18	Dr. Mirium Reiner	Techniri University, Israel	Prof. R. Subba Rao, HOD, Chemical	Virtual Reality	Yes
44	2018	22.01.18	Dr. R Siva Subramanian	PSG institute, Advanced Studies, Asst. Professor	Dr. Murali Rangarajan	Electrochemical Sensors and Supercapacitors	Yes
45	2018	03.02.18	Dr. Prasanth Raghavan	Cochin university, Science and Technology	Dr. Meera Balachandran	Invited talk - Batteries on fire	Yes

S.No	Year	Date	Guest Name	Guest Affiliation	Faculty Name	Purpose/ Topic of Interaction	Student Participation
46	2018	20.04.18	Dr. Anandan	NIT, Trichur, Associate Professor	Dr. Nikhil Kothurkar	Phd review meeting	No
47	2018	27.04.18	Dr. Subbiah Alwarappan	CSIR-CECRI, Senior Scientist	Dr. Murali Rangarajan	MoS2-based Electrochemical Sensors	Yes
48	2018	14.06.18	Prof. Anup Kumar Ghosh	IIT-Delhi, Professor & Head	Dr. K Jayanarayanan		No
49	2018	09.07.18	Dr. K Kalyana Sundaram	EPFL, Switzerland, Research Scientist	Dr. D Kumaresan	Guest lecture	Yes
50	2018	09.08.18	Dr. P. Kalaichelvi	Nest, Trichur, Professor	Dr. D. Kumaresan	PhD review meeting	No
51	2018	23.08.18	Dr. John Atkinson, Dr. Lisa Vahapoglu Lenker	State University of New York, Buffalo	Dr. Murali Rangarajan, Dr. Thirugnasambandam, G. M., Dr. Udaya Bhaskar Reddy Ragula, Dr. Sriram Devanathan, Dr. Sudip Kumar Batabyal (ACIRI)	Research Collaborations on Energy and Materials	No
52	2018	14.05.18 to 17.05.18	Prof. Peter Handel	Professor, Signal Processing, KTH Sweden	Dr. Murali Rangarajan, Dr. Vidhya Balasubramanian (CSE), Dr. K. K. Sasi (EEE), Dr. Sriram Devanathan, Dr. Thirugnasambandam, G. M., Dr. Udaya Bhaskar Reddy Ragula	Cyberphysical Systems for Sustainable Water Management	No

2.2.5. Initiatives related to industry internship/summer training (10)

From the year of inception of the BTech Chemical Engineering program, there have been significant ties with the industry. The department supports the internship/summer training requirements of the students in the following ways.

1. Through providing contacts to the industries, R&D institutions, or institutes of eminence (such as IISc and IITs).
2. Through providing bonafide letters
3. Through providing faculty technical guidance for any mini-projects or research being undertaken at the host institution
4. Through orientation of the students on the importance and significance of the internship/summer training
5. Through providing letters of recommendation/reference for the students

Implementation

The following is a list of industrial organizations, R&D institutions, and academic institutions at which our students have pursued their internship/summer training.

Company Name/Research Institutions
Hempel Paints (Baharain)
Sandoz Novaratis Company
Megafoods Products Madras (P) Ltd
Bharath Petroleum Corporation Ltd
High Energy Materials Research Laboratory
SRF Ltd (Chemicals Technology Group)
Tamilnadu Newsprint Ltd
Coromandel International Ltd
Granules India Ltd
Mangalore Chemicals and Fertilizers Ltd
Exide
SPIC
CPCL
Western India Plywoods Ltd
Associated Cement Company
Kavin Engineering and Services Pvt Ltd
BASF Catalyst India Pvt Ltd
Parle Biscuits Pvt Ltd
FACT Travancore
Saint Gobain India Pvt Ltd
Asian Paints
Dr. Reddys Laboratories Ltd
Indian Rare Earths Ltd
Steel Authority of India Ltd
CETEX Petrochemicals Ltd

ONGC
Technip FMC
Madras Fertilizers Ltd
Sterlite Copper
Ramco Cements Ltd
Hindustan Insecticides Ltd
Empreal-KGDS Renewable Energy Pvt Ltd
Research Designs & Standards Organization
Caprol Paints Ltd
Hindustan Unilever Ltd
EID Parry India Ltd
DFE Pharma Ltd
Indian Oil Corporation Ltd
Kothari Sugars and Chemicals Ltd
Malabar Cements Ltd
Seshasayee Paper & Boards Ltd
Sanmar Speciality Ltd
Ramco Cements Ltd
Rashtriya Chemicals and Fertilizers Ltd
Nagarjuna Fertilizers and Chemicals Ltd
Nippon Paints India Pvt Ltd
Ponni Sugars and Chemicals Pvt Ltd
Idhayam Oil Plant Ltd
L&T Chiyoda Ltd
Orchid Pharmaceuticals Ltd
PRD Kansai Nerolac Paints Ltd
Sakthi Sugars Ltd
Tamilnadu Petroproducts Ltd
Matix Fertilizers and Chemicals Ltd
Pioneer Fertilizers Ltd
Travancore Sugars and Chemicals Ltd
United Breweries Ltd
Kerala Minerals and Metals Ltd
Titan Paints Ltd
TVS Elastomeric Engineered Products Pvt Ltd
Vaighai Agro Products Ltd
WABCO India Pvt Ltd
Internshala
Indian National Science Academy
Institute of Chemical Technology
IIT Madras
IISC, Bangalore
NIT, Trichy

Table 2.2.5. Student participation in internship/summer training

Batch	Class strength	# Internship Students	%Internship Participation
2014-2018	65	53	81.54
2015-2019	60	47	78.33
2016-2020*	43	27	62.79

*Note: This batch has just completed the 3rd year, and therefore, their data for the internship/summer training is not available.

Subsequently, it may be noted anywhere from upwards of 80% of students have been doing in-plant training and/or summer internship across chemical industries and research institutions during their undergraduate program.

The training opportunities available and availed are diverse, spreading across numerous chemical industries (petroleum, fertilizers, bulk chemicals, surface coatings, plastics, metallurgy, food, pharma, nuclear, paper, medical, process engineering, consultancy, etc. Additionally, in alignment with the program outcomes, the training has spanned across the various core chemical engineering subjects (with industrial applications): fluid-heat-mass transport, thermodynamics, chemical technology, chemical reaction engineering, mechanical operations, materials science, process instrumentation and control, strength of materials, process safety, etc. The students have gained experience with respect to mass and energy balances, process optimization and troubleshooting, process modeling & simulation, safety engineering & hazard analysis, economic assessment, process design, equipment design, etc. Thus, there has been a clear and significant contribution to the program outcomes.

CRITERION 3: Course Outcomes and Program Outcomes (175)

3.1. Establish the correlation between the courses and the Program Outcomes (POs) & Program Specific Outcomes (25)

- NBA defined Program Outcomes as mentioned in Annexure I and Program Specific Outcomes as defined by the Program. Six to ten matrices of core courses are to be mentioned with at least one per semester.
- Select core courses to demonstrate the mapping/correlation with all POs and PSOs.
- Number of Outcomes for a Course is expected to be around 6.

Correlation levels 1, 2 or 3 are as defined below:
1: Slight (Low, < 40%) 2: Moderate (Medium, 40% to 60%)

3: Substantial (High, > 60%)

Program Articulation Matrix

Table B.3.1a: **Program articulation matrix for batch 2014-2018**

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Communicative English	ENG 111								2	2	3		2			
Physics	PHY 100	3	3										1			
Chemistry	CHY 100	3	3	2	1											
Calculus, Matrix Algebra and ODE	MAT 111	3	3													
Electrical Engineering	EEE100	3	3													
Engineering Mechanics	MEC 100	3	3	3	2								1			

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Computer Programming	CSE100	1	2	2										3	2	
Engineering Drawing	MEC181	3	3	3	3		2				3		3	2	2	2
Physics Lab	PHY181	2	2	2	2	2	1							1	2	
Chemistry Lab	CHY181	3	3	1												
Workshop A	MEC180	2	2	1		1				2	1		1	1	1	
Workshop B	EEE180	3	2	2						3			1			
Computer Programming Lab	CSE180	1	2	2		1								3	2	
Cultural Ed. I	CUL101						2	3	3	2	3	2	2	3	3	
Technical Communication	ENG112								2	2	3		2			
Vector Calculus, Fourier Series and PDE	MAT112	3	2	1									1			
Electronics Engineering	ECE100	2	3	2									1	3		
Computer Aided Drawing	MEC182	3	3	3	2	2	2				3		3	2	2	2
Cultural Ed. II	CUL102						2	3	3	2	3	2	2	3	3	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Integral Transforms and Complex Analysis	MAT 211	3	3	3										2		
Introduction to Chemical Engineering	CHE 210	3	3	3	1									3	1	
Fluid Mechanics	CHE 211	3	3	3	2									3	3	1
Inorganic Chemical Technology	CHE 220	3	3	3	2		2	3	3			2		3	3	3
Inorganic and Physical Chemistry	CHE 240	3	2	2	2	2	2	2					2	2	1	2
Inorganic and Physical Chemistry Lab	CHE 290	3	2	2	2	3				2			2	2	3	1
Fluid Mechanics Lab	CHE 291	3	3	3	3				2	3	2			3	3	3
Mathematical Statistics & Numerical Methods	MAT 212	3	3	2												
Chemical Engineering Thermodynamics	CHE 212	3	3	1	1									3	1	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Heat Transfer in Chemical Engineering	CHE 213	3	3	3	2			2						3	3	1
Mechanical Operations	CHE 221	3	3	3	2		2	3	3			2		3	3	3
Material Science and Strength of Materials	CHE 241	3	3	2	2									3	3	3
Strength of Materials Lab	CHE 292	3	3	3	3					2				3	3	3
Mechanical Operations Lab	CHE 293	3	3	3	2									2	3	3
Diffusional Mass Transfer Operations	CHE 310	3	3	3	3									3	3	3
Chemical Reaction Engineering	CHE 311	3	3	3	3	3							1	3	3	3
Organic Chemical Technology	CHE 320	3	3	2	2		2	3	3					3	1	1
Advanced Topics in Chemical Engineering	CHE 330	2	2	3	3	3	3	1	2	3	3		3	3	1	3
Environmental Studies	ENV 200	3	3	3	2			2						3	3	1

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Chemical Technology Lab	CHE 390	3	3		2	3				3	2			3	3	2
Heat Transfer Lab	CHE 391	3	2	2					3	2	1	1		3	1	3
Hindi	15HIN101									2	3					
Equilibrium Staged Operations	CHE 312	3	3	2	2					2				3	2	
Computational Methods in Chemical Engg	CHE 313	3	2		2	3								3	3	2
Process Dynamics and Control	CHE 331	3	3	3	3	2	1							3	3	2
Mass Transfer Lab	CHE 392	3	2											3	2	
Chemical Reaction Engineering Lab	CHE 393	3	3	1										3	2	
Seminar	CHE 397	3	3	2	2	3	3	3	3	3	3		3	3	3	3
Environmental Engg for Process Industries	CHE 400	3	2	3	3		3	3	3			3		3	3	3
Transport Phenomena	CHE 410	3	3	2	2					2				3	3	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Process Equipment Design and Drawing	CHE 430	2	2	3			1			2				3	3	1
Principles of Management	MNG 400	2	2	2	2	2	3	2	3	3	2	2	3			
Computer Aided Design Lab	CHE 490	3	3			3		3		3				3	3	2
Chemical Process Control Lab	CHE 491	3	3		3	3				3	3			3	3	3
Project	CHE 499	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Modern Separation Methods	CHE 351	3	2	2		2		1						3	2	
Petroleum Refining & Petrochemical Tech	CHE 352	3	2	2	2		1	1		2				3	2	
Biochemistry and Molecular Biology	CHE 440	3	3				2	2	2					1	3	1
Chemical Process Modelling and Simulation	CHE 461	3	3	3	3	1	1	1		2			3	3	3	3

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Interfacial Science and Engineering	CHE 371	3	2	2	1	2		2						2	2	
Polymer Materials and Rheology	CHE 372	3	3	2	2	2	2	2		3			2	3	2	2
Mgt and Economics of Chemical Process	CHE 481	3	3		3	3				3	3			3	3	3
Nanoscience and Nanotechnology	CHE 471	2	2	2	2	2								2	2	1
Foundation of Information Technology	CSE479	1	2	2	1	1			2					2	2	
Green Chemistry and Technology	CHY 264	3	2	2		2		2					2	2	2	2
Instrumental Method of Analysis	CHY 259	2	2	2		3								2	2	2
Chemistry of Engineering Materials	CHY 251	3	2	3		3		2				2	2	2	2	3
Electrochemical Energy Systems	CHY 271	1	1													

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
and Processes																
Understanding Science of Food and Nutrition	HUM 259		1	1			1	1	1	1	1	1	3			
Psychology for Engineers	HUM 256						3	3	2	3	2	1	2			
Indian Classics for 21st Century	HUM 250						3		3	3	2	2	2			
Business Communications	ENG 251						2			2	3	1	2			
Psychology for Effective Living	HUM 257						2	3	3	2	3	2	1			
Glimpses of Eternal India	HUM 252						3		3	3	2	2	2			
Indian Thoughts in English	ENG 252						2		3				1			
Soft Skills I	SSK111		3		2				2	3	3	3	3			
Soft Skills II	SSK112		3		2					3	3	2	3			
Soft Skills III	SSK113		3		2				2	3	3		3			

Course Articulation Matrix

The select core courses are listed below for mapping/correlation with all POs and PSOs.
The PSOs are listed in Appendix 1.

***Table B.3.1b*: Course articulation matrix of select six core courses of 2014-2018 regulation**

CHE211 Fluid Mechanics – Semester III

CO Code	Course outcome statement
CO1	Understand basic properties of fluids, stress-strain relationship in fluids, classify their behavior and establish force balance in static systems
CO2	Analyze fluid flow problems in different configurations with the application of the momentum and energy equations. Understand principles and functioning of flow metering devices and apply Bernoulli equation to determine the performance of flow-metering devices.
CO3	Analyse fluid behaviour in fixed bed systems , compute power requirement in fixed bed system and determine minimum fluidization velocity in fluidized bed.
CO4	Determine and analyze the performance aspects of fluid machinery specifically for centrifugal pump and reciprocating pump. Develop dimensionless groups that help in scale-up and scale-down of fluid flow systems.

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2									3	3	1
CO2	3	3	3	2									3	3	1
CO3	3	3	3	2									3	3	1
CO4	3	3	3	2									3	3	1

CHE213 Heat Transfer in Chemical Engineering– Semester IV

CO Code	Course outcome statement
CO1	Ability to understand conduction, convection, and radiation heat transfer modes
CO2	Ability to estimate value of heat transfer coefficient for systems with and without phase change
CO3	Ability to understand and solve the coupled heat transfer and fluid dynamics problems
CO4	Design and analyze the performance of heat exchangers
CO5	Design and analyze the performance of evaporators

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2			2						3	3	1
CO2	3	3	3	2			2						3	3	1
CO3	3	3	3	3			2						3	3	1
CO4	3	3	3	2			1						3	3	1
CO1	3	3	3	2			1						3	3	1

CHE310 Diffusional Mass Transfer Operations – Semester V

CO Code	Course outcome statement
CO1	Understand fundamental concepts in mass transfer
CO2	Ability to solve systems consisting of diffusion and convection
CO3	Ability to estimate value of mass transfer coefficient for different systems involving fluid flow
CO4	Design and analyze the performance of absorbers, humidifier, and crystallizer

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3									2	2	2
CO2	3	3	3	3									2	2	2
CO3	3	3	3	3									2	2	2
CO4	3	3	3	1									3	3	3

CHE312 Equilibrium Staged Operations– Semester VI

CO Code	Course outcome statement
CO1	Develop a strong conceptual understanding of various mass transfer processes
CO2	Understand general design and operations of mass transfer equipment
CO3	Analyze chemical engineering operations involving mass transfer equipment
CO4	Ability to solve problems involving staged mass transfer processes such as distillation, extraction, adsorption, absorption and leaching.

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2						2				3		
CO2	3	2	2						2				3	2	
CO3	3	3	2						2				3	2	
CO4	3	3	3	2					2				3	2	

CHE331 Process Dynamics and Control – Semester VI

CO Code	Course outcome statement
CO1	Understand and apply basic principles to Dynamic modelling and system behaviour study.
CO2	Develop block diagram and utilize control algorithms to design and analyse transient response of control schemes for various configurations.
CO3	Analyse stability of Control Systems and tuning of process controllers.
CO4	Application of control systems in chemical processes.

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3		1							3	3	1
CO2	3	3	3	3									3	3	3
CO3	3	3	3	3	2								3	3	3
CO4	3	3	3	2									3	3	1

CHE410 Transport Phenomena– Semester VII

CO Code	Course outcome statement
CO1	Understanding of mechanism of various transport processes like momentum, heat and mass transport
CO2	Develop shell balances for steady flow through various geometries in momentum, heat and mass transport problems
CO3	Analyze chemical engineering industrial problems along with their appropriate boundary conditions for momentum, heat and mass transport problems
CO4	Ability to develop steady and time dependent solutions with their limitations for momentum, heat and mass transport problems.

CO Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2					2				3	2	
CO2	3	2	2	2					2				3	3	
CO3	3	3	2	2					2				3	3	
CO4	3	3	3	3					2				3	3	

3.2 Attainment of Course Outcomes (75)

3.2.1 Describe the assessment tools and processes used to gather the data upon which the evaluation of Course Outcome is based (10)

The process followed at Amrita School of Engineering, Coimbatore for CO computation in a theory course is given in Figure 3.2.1. Figure 3.2.2 shows flow diagram of the same. In the CO attainment calculation for a course, 80% is contributed through direct and 20% through Indirect. As per the university regulation, 50% of the direct is contributed by Cumulative Internal Examination (CIE) and 50% from Semester End Examinations (SEE) for theory courses. In the CIE, Periodical 1, Periodical 2 and Continuous Assessment contributes 15, 15 and 20 respectively. For Lab courses, 80% and 20% is contributed by continuous assessment and end semester examinations respectively to the direct attainment.

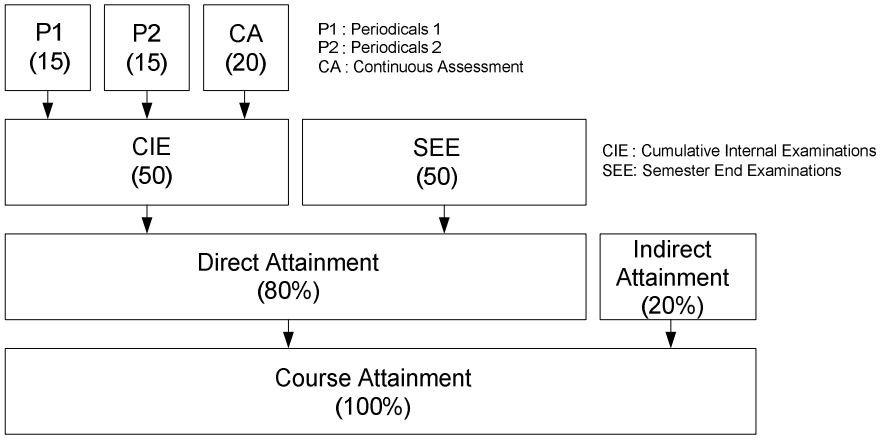
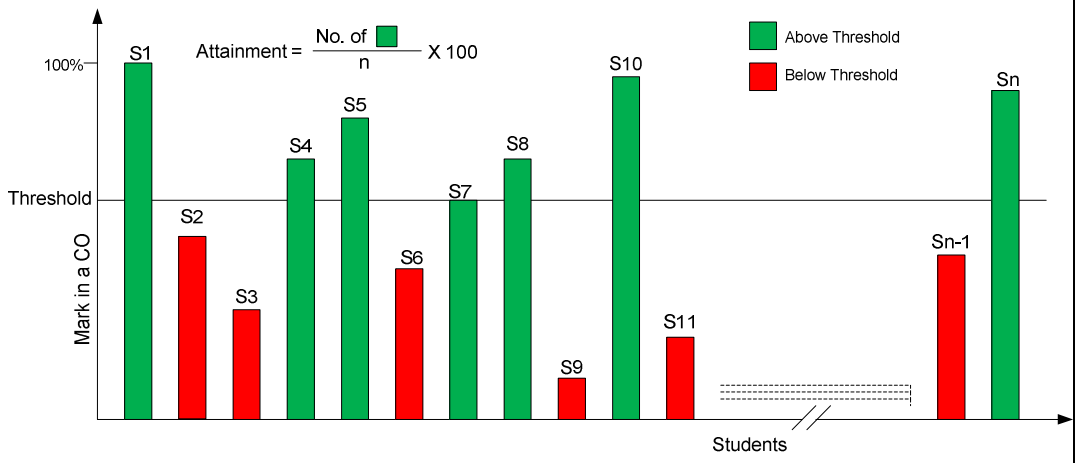


Figure B.3.2.1 CO attainment for theory courses

Attainment calculation are based on the following expression:

Direct	The direct part of the CO attainment is computed through exams. The percentage of students in the class who scored more than threshold percentage of marks in the respective CO is the attainment. 
Indirect	Based on Survey $$Attainment = \frac{\sum_{i=1}^{5} i * no.of\ students\ gave\ i\ option}{5 * no.of\ responses}$$

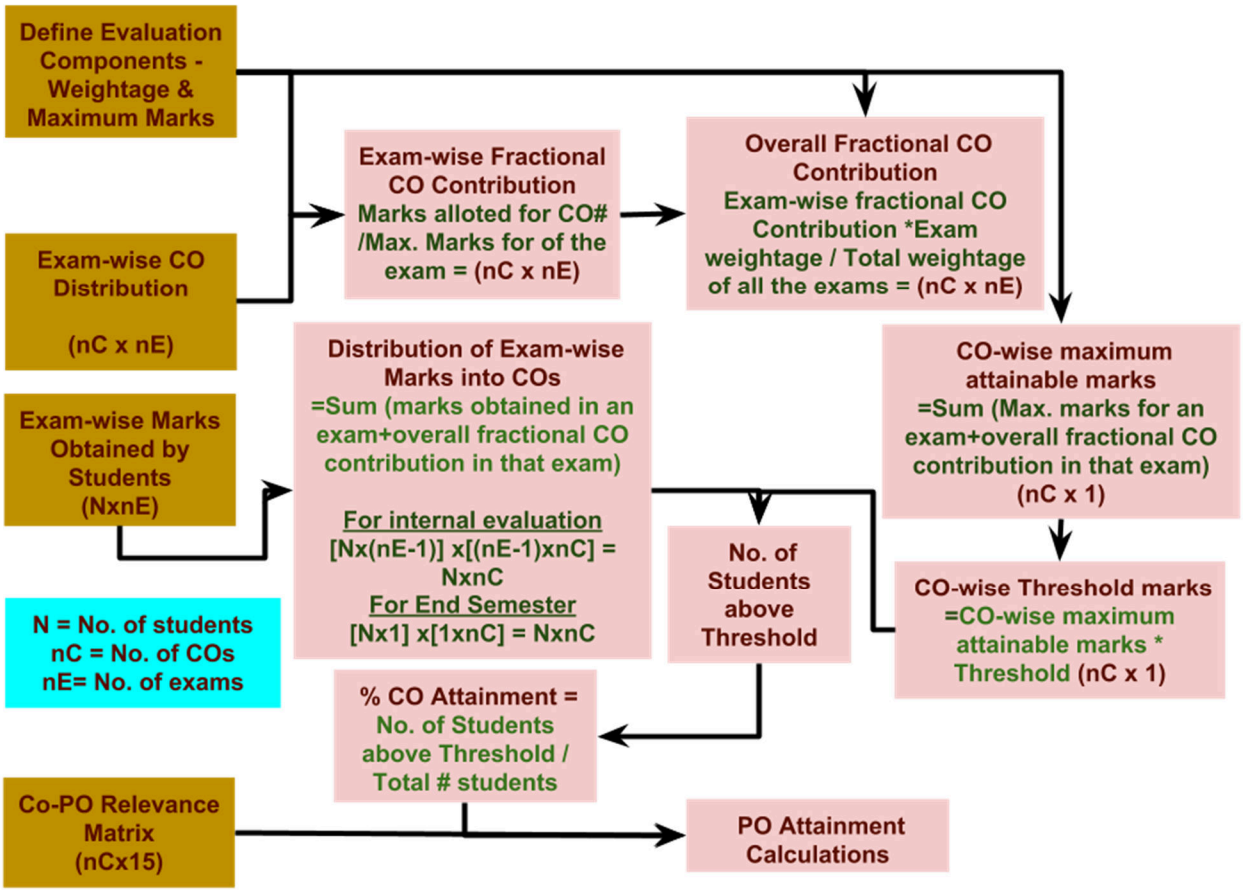


Figure B.3.2.2 Flow diagram showing steps involved in CO-PO attainment calculations

Target of 50% for theory courses and 60% for lab courses was fixed to check attainment (Yes/No) of COs for every courses.

3.2.2 Record the attainment of Course Outcomes of all courses with respect to set attainment levels (65)

Table 3.2.2 Course Outcomes for 2014-2018 batch from 2nd year onwards. The first year outcomes are presented in Criterion 8.

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment	Level	Attainment	Level	Attainment	Level		
Integral Transforms and Complex Analysis MAT211	CO1	44	2	18	1	21	2	79	3	33	2	50	No
	CO2	40	2	18	1	30	2	79	3	40	2	50	No
	CO3	47	2	18	1	35	2	79	3	44	2	50	No
	CO4	53	2	18	1	28	2	79	3	38	2	50	No
	CO5	79	3	18	1	28	2	79	3	38	2	50	No
	CO6	79	3	18	1	28	2	79	3	38	2	50	No
Introduction to Chemical Engineering CHE210	CO1	74	3	75	3	72	3	79	3	74	3	50	Yes
	CO2	68	3	75	3	72	3	79	3	74	3	50	Yes
	CO3	72	3	75	3	75	3	79	3	76	3	50	Yes
	CO4	92	3	75	3	88	3	79	3	86	3	50	Yes

Fluid Mechanics CHE211	CO1	62	3	57	2	54	2	91	3	61	2	50	Yes
	CO2	65	3	57	2	59	2	91	3	65	2	50	Yes
	CO3	66	3	57	2	60	2	91	3	66	2	50	Yes
	CO4	65	3	57	2	57	2	91	3	64	2	50	Yes
Inorganic Chemical Technology CHE220	CO1	74	3	52	2	65	3	84	3	68	3	50	Yes
	CO2	72	3	52	2	62	3	84	3	66	3	50	Yes
	CO3	72	3	52	2	62	3	84	3	66	3	50	Yes
	CO4	72	3	52	2	59	2	84	3	64	2	50	Yes
Inorganic and Physical Chemistry CHE240	CO1	58	2	64	3	62	3	70	3	64	3	50	Yes
	CO2	59	2	64	3	59	2	70	3	61	2	50	Yes
	CO3	61	3	64	3	59	2	70	3	61	2	50	Yes
	CO4	65	3	64	3	58	2	70	3	60	2	50	Yes
Inorganic and Physical Chemistry Lab CHE290	CO1	89	3	50	2	86	3	74	3	84	3	60	Yes
	CO2	89	3	50	2	86	3	74	3	84	3	60	Yes
	CO3	89	3	50	2	86	3	74	3	84	3	60	Yes
	CO4	89	3	50	2	86	3	74	3	84	3	60	Yes
Fluid Mechanics Lab CHE291	CO1	86	3	82	3	86	3	90	3	87	3	60	Yes
	CO2	86	3	82	3	86	3	90	3	87	3	60	Yes
	CO3	86	3	82	3	86	3	90	3	87	3	60	Yes
	CO4	86	3	82	3	86	3	90	3	87	3	60	Yes
Indian Classics for 21st Century HUM250	CO1	88	3	100	3	92	3	0	1	74	2.6	50	Yes
	CO2	88	3	100	3	92	3	0	1	74	2.6	50	Yes
	CO3	84	3	100	3	96	3	0	1	77	2.6	50	Yes
	CO4	84	3	100	3	96	3	0	1	77	2.6	50	Yes

	CO5	72	3	100	3	96	3	0	1	77	2.6	50	Yes
Understanding science of food and nutrition HUM259	CO1	85	3	93	3	89	3	89	3	89	3	50	Yes
	CO2	89	3	93	3	89	3	89	3	89	3	50	Yes
	CO3	89	3	93	3	93	3	89	3	92	3	50	Yes
	CO4	89	3	93	3	93	3	89	3	92	3	50	Yes
	CO5	85	3	93	3	89	3	89	3	89	3	50	Yes
Psychology for Engineers HUM256	CO1	100	3	100	3	100	3	0	1	100	3	50	Yes
	CO2	100	3	100	3	100	3	0	1	100	3	50	Yes
	CO3	100	3	100	3	100	3	0	1	100	3	50	Yes
	CO4	100	3	100	3	100	3	0	1	100	3	50	Yes
Mathematical Statistics and Numerical Methods MAT212	CO1	88	3	57	2	72	3	80	3	74	3	50	Yes
	CO2	97	3	57	2	77	3	80	3	78	3	50	Yes
	CO3	97	3	57	2	77	3	80	3	78	3	50	Yes
	CO4	83	3	57	2	70	3	80	3	72	3	50	Yes
	CO5	86	3	57	2	72	3	80	3	73	3	50	Yes
	CO6	85	3	57	2	71	3	80	3	73	3	50	Yes
Chemical Engineering Thermodynamics CHE212	CO1	79	3	63	3	71	3	75	3	72	3	50	Yes
	CO2	75	3	63	3	69	3	75	3	70	3	50	Yes
	CO3	68	3	63	3	66	3	75	3	68	3	50	Yes
	CO4	92	3	63	3	68	3	75	3	69	3	50	Yes
Heat Transfer in Chemical Engineering CHE213	CO1	63	3	65	3	62	3	97	3	69	3	50	Yes
	CO2	68	3	65	3	65	3	97	3	71	3	50	Yes
	CO3	75	3	65	3	69	3	97	3	75	3	50	Yes
	CO4	71	3	65	3	68	3	97	3	74	3	50	Yes

	CO5	85	3	65	3	65	3	97	3	71	3	50	Yes
Mechanical operations CHE221	CO1	66	3	57	2	62	3	83	3	66	3	50	Yes
	CO2	75	3	57	2	63	3	83	3	67	3	50	Yes
	CO3	91	3	57	2	57	2	83	3	62	2	50	Yes
	CO4	88	3	57	2	57	2	83	3	62	2	50	Yes
Materials Science and Strength of Materials CHE241	CO1	62	3	54	2	60	2	95	3	67	2	50	Yes
	CO2	69	3	54	2	62	3	95	3	68	3	50	Yes
	CO3	72	3	54	2	68	3	95	3	73	3	50	Yes
	CO4	72	3	54	2	63	3	95	3	69	3	50	Yes
	CO5	83	3	54	2	54	2	95	3	62	2	50	Yes
Strength of Materials lab CHE292	CO1	89	3	85	3	89	3	93	3	90	3	60	Yes
	CO2	89	3	85	3	89	3	93	3	90	3	60	Yes
	CO3	89	3	85	3	89	3	93	3	90	3	60	Yes
Mechanical Operations lab CHE293	CO1	88	3	77	3	86	3	84	3	86	3	60	Yes
	CO2	88	3	77	3	86	3	84	3	86	3	60	Yes
	CO3	88	3	77	3	86	3	84	3	86	3	60	Yes
	CO4	88	3	77	3	86	3	84	3	86	3	60	Yes
Soft Skills I SSK111	CO1	92	3	-	-	92	3	78	3	89	3	50	Yes
	CO2	92	3	-	-	92	3	78	3	89	3	50	Yes
	CO3	92	3	69	3	74	3	74	3	74	3	50	Yes
	CO4	92	3	69	3	72	3	73	3	72	3	50	Yes
	CO5	92	3	69	3	74	3	78	3	75	3	50	Yes
	CO6	92	3	69	3	82	3	79	3	81	3	50	Yes

HUM257 Psychology for effective living	CO1	100	3	90	3	100	3	0	1	100	3	50	Yes
	CO2	100	3	90	3	100	3	0	1	100	3	50	Yes
	CO3	100	3	90	3	100	3	0	1	100	3	50	Yes
	CO4	100	3	90	3	100	3	0	1	100	3	50	Yes
HUM252 Glimpses of Eternal India	CO1	95	3	95	3	100	3	0	1	80	3	50	Yes
	CO2	100	3	95	3	100	3	0	1	80	3	50	Yes
	CO3	100	3	95	3	100	3	0	1	80	3	50	Yes
	CO4	100	3	95	3	100	3	0	1	80	3	50	Yes
	CO5	100	3	95	3	100	3	0	1	80	3	50	Yes
Electrochemical Energy Systems CHY271	CO1	59	2	33	1	46	2	82	3	53	2	50	Yes
	CO2	72	3	77	3	75	3	82	3	76	3	50	Yes
	CO3	60	3	53	2	56	2	82	3	61	3	50	Yes
	CO4	60	3	44	2	52	2	82	3	58	2	50	Yes
	CO5	49	2	67	3	58	2	82	3	63	3	50	Yes
	CO6	57	2	0	1	29	1	82	3	39	1	50	No
Diffusional Mass Transfer Operations CHE310	CO1	65	3	68	3	65	3	74	3	67	3	50	Yes
	CO2	51	2	68	3	62	3	74	3	64	3	50	Yes
	CO3	42	2	68	3	60	3	74	3	63	3	50	Yes
	CO4	40	2	68	3	62	3	74	3	64	3	50	Yes
Chemical Reaction Engineering CHE311	CO1	71	3	51	2	57	2	85	3	62	2	50	Yes
	CO2	69	3	-	-	69	3	85	3	72	3	50	Yes
	CO3	62	3	51	2	54	2	85	3	60	2	50	Yes
	CO4	74	3	51	2	55	2	85	3	61	2	50	Yes
	CO5	57	2	51	2	55	2	85	3	61	2	50	Yes

	CO6	89	3	51	2	57	2	85	3	62	2	50	Yes
Organic Chemical Technology CHE320	CO1	77	3	74	3	77	3	80	3	78	3	50	Yes
	CO2	83	3	74	3	77	3	80	3	78	3	50	Yes
	CO3	83	3	74	3	77	3	80	3	78	3	50	Yes
	CO4	92	3	74	3	74	3	80	3	75	3	50	Yes
Advanced Topics in Chemical Engineering CHE330	CO1	80	3	92	3	92	3	85	3	91	3	70	Yes
	CO2	80	3	92	3	92	3	85	3	91	3	70	Yes
	CO3	80	3	92	3	92	3	85	3	91	3	70	Yes
	CO4	80	3	92	3	92	3	85	3	91	3	70	Yes
Environmental Studies ENV200	CO1	82	3	88	3	87	3	87	3	87	3	50	Yes
	CO2	90	3	88	3	90	3	87	3	89	3	50	Yes
	CO3	87	3	88	3	88	3	87	3	88	3	50	Yes
	CO4	87	3	94	3	87	3	87	3	87	3	50	Yes
	CO5	94	3	94	3	94	3	0	1	75	3	50	Yes
Chemical Technology Lab CHE390	CO1	91	3	42	2	91	3	82	3	89	3	60	Yes
	CO2	91	3	42	2	91	3	82	3	89	3	60	Yes
	CO3	91	3	42	2	91	3	82	3	89	3	60	Yes
	CO4	91	3	42	2	91	3	82	3	89	3	60	Yes
Heat Transfer Lab CHE391	CO1	85	3	69	3	83	3	84	3	83	3	60	Yes
	CO2	85	3	69	3	83	3	84	3	83	3	60	Yes
	CO3	85	3	69	3	83	3	84	3	83	3	60	Yes
15HIN101 Hindi	CO1	100	3	100	3	100	3	85	3	97	3	50	Yes
	CO2	100	3	100	3	100	3	85	3	97	3	50	Yes
	CO3	100	3	100	3	100	3	85	3	97	3	50	Yes

		CO4	100	3	100	3	100	3	85	3	97	3	50	Yes
	Soft skills II SSK112	CO1	89	3	-	-	89	3	78	3	87	3	50	Yes
		CO2	89	3	-	-	89	3	78	3	87	3	50	Yes
		CO3	89	3	25	1	31	1	74	3	39	1	50	No
		CO4	89	3	25	1	28	1	73	3	37	1	50	No
		CO5	89	3	25	1	34	1	78	3	43	1	50	No
		CO6	89	3	25	1	34	1	79	3	43	1	50	No
	Green chemistry & technology CHY264	CO1	93	3	78	3	88	3	83	3	87	3	50	Yes
		CO2	88	3	78	3	88	3	83	3	87	3	50	Yes
		CO3	83	3	78	3	85	3	83	3	85	3	50	Yes
		CO4	78	3	78	3	78	3	83	3	79	3	50	Yes
	Instrumental method of Analysis CHY259	CO1	88	3	96	3	96	3	72	3	91	3	50	Yes
		CO2	80	3	96	3	96	3	72	3	91	3	50	Yes
		CO3	88	3	96	3	96	3	72	3	91	3	50	Yes
		CO4	100	3	96	3	96	3	72	3	91	3	50	Yes
	Equilibrium Staged Operations CHE312	CO1	91	3	62	3	84	3	87	3	85	3	50	Yes
		CO2	90	3	62	3	83	3	87	3	84	3	50	Yes
		CO3	85	3	62	3	77	3	87	3	79	3	50	Yes
		CO4	90	3	62	3	81	3	87	3	82	3	50	Yes
	Computational Methods in Chemical Engineering CHE313	CO1	78	3	66	3	77	3	75	3	77	3	50	Yes
		CO2	78	3	66	3	71	3	75	3	72	3	50	Yes
		CO3	82	3	66	3	80	3	75	3	79	3	50	Yes
		CO4	82	3	66	3	71	3	75	3	72	3	50	Yes
Process D		CO1	63	3	66	3	63	3	89	3	68	3	50	Yes

	CO2	71	3	66	3	66	3	89	3	71	3	50	Yes
	CO3	85	3	66	3	69	3	89	3	73	3	50	Yes
	CO4	92	3	66	3	69	3	89	3	73	3	50	Yes
Mass Transfer lab CHE392	CO1	77	3	75	3	74	3	82	3	75	3	50	Yes
	CO2	77	3	75	3	74	3	82	3	75	3	50	Yes
	CO3	77	3	75	3	75	3	82	3	77	3	50	Yes
	CO4	77	3	75	3	75	3	82	3	77	3	50	Yes
Chemical Reaction Engineering lab CHE393	CO1	92	3	88	3	92	3	83	3	90	3	60	Yes
	CO2	92	3	88	3	92	3	83	3	90	3	60	Yes
	CO3	92	3	88	3	92	3	83	3	90	3	60	Yes
	CO4	92	3	88	3	92	3	83	3	90	3	60	Yes
Seminar CHE397	CO1	97	3	97	3	97	3	80	3	94	3	50	Yes
	CO2	97	3	97	3	97	3	80	3	94	3	50	Yes
	CO3	97	3	97	3	97	3	80	3	94	3	50	Yes
Soft skills III SSK113	CO1	65	3	-	-	65	3	78	3	67	3	50	Yes
	CO2	65	3	-	-	65	3	78	3	67	3	50	Yes
	CO3	65	3	59	2	55	2	74	3	59	2	50	Yes
	CO4	65	3	59	2	57	2	73	3	60	2	50	Yes
	CO5	65	3	59	2	55	2	78	3	60	2	50	Yes
	CO6	65	3	59	2	59	2	79	3	63	2	50	Yes
Chemistry of Engineering Materials CHY251	CO1	75	3	77	3	75	3	80	3	76	3	50	Yes
	CO2	75	3	77	3	79	3	80	3	80	3	50	Yes
	CO3	79	3	77	3	79	3	80	3	80	3	50	Yes
	CO4	83	3	77	3	79	3	80	3	80	3	50	Yes

Polymer Material Rheology CHE372	CO1	82	3	85	3	82	3	87	3	83	3	50	Yes
	CO2	85	3	85	3	85	3	87	3	85	3	50	Yes
	CO3	90	3	85	3	85	3	87	3	85	3	50	Yes
	CO4	97	3	85	3	85	3	87	3	85	3	50	Yes
Petroleum Refining and Petrochemical Technology CHE352	CO1	96	3	58	2	73	3	82	3	75	3	50	Yes
	CO2	85	3	58	2	73	3	82	3	75	3	50	Yes
	CO3	85	3	58	2	65	3	82	3	69	3	50	Yes
	CO4	85	3	58	2	65	3	82	3	69	3	50	Yes
Environmental Engineering for Process Industries CHE400	CO1	71	3	44	2	62	3	77	3	65	3	50	Yes
	CO2	71	3	49	2	63	3	77	3	66	3	50	Yes
	CO3	77	3	69	3	75	3	77	3	76	3	50	Yes
	CO4	71	3	72	3	71	3	77	3	73	3	50	Yes
Transport Phenomena CHE410	CO1	46	2	69	3	52	2	83	3	58	2	50	Yes
	CO2	48	2	74	3	54	2	83	3	60	2	50	Yes
	CO3	52	2	45	2	49	2	83	3	56	2	50	Yes
	CO4	53	2	32	1	46	2	83	3	53	2	50	Yes
Process Equipment Design and Drawing CHE430	CO1	87	3	72	3	80	3	81	3	80	3	50	Yes
	CO2	86	3	77	3	82	3	81	3	81	3	50	Yes
	CO3	94	3	82	3	88	3	81	3	87	3	50	Yes
	CO4	100	3	65	3	83	3	81	3	82	3	50	Yes
Principles of Management MNG400	CO1	89	3	63	3	80	3	77	3	80	3	50	Yes
	CO2	85	3	76	3	83	3	77	3	82	3	50	Yes
	CO3	87	3	31	1	69	3	77	3	70	3	50	Yes
	CO4	95	3	72	3	72	3	77	3	73	3	50	Yes

	CO5	-	0	60	2	60	2	77	3	63	3	50	Yes
	CO6	-	0	85	3	92	3	77	3	89	3	50	Yes
Computer-aided Design lab CHE490	CO1	69	3	57	2	68	3	84	3	71	3	60	Yes
	CO2	69	3	57	2	65	3	84	3	68	3	60	Yes
	CO3	69	3	57	2	65	3	84	3	68	3	60	Yes
	CO4	69	3	57	2	65	3	84	3	68	3	60	Yes
Chemical process Control lab CHE491	CO1	92	3	82	3	87	3	83	3	86	3	60	Yes
	CO2	92	3	82	3	87	3	83	3	86	3	60	Yes
	CO3	92	3	82	3	87	3	83	3	86	3	60	Yes
	CO4	92	3	82	3	87	3	83	3	86	3	60	Yes
Modern Separation Methods CHE351	CO1	76	3	65	3	74	3	88	3	77	3	50	Yes
	CO2	67	3	65	3	65	3	88	3	70	3	50	Yes
	CO3	52	2	65	3	59	2	88	3	65	2	50	Yes
	CO4	100	3	65	3	67	3	88	3	72	3	50	Yes
Chemical process modelling simulation CHE461	CO1	71	3	67	3	69	3	84	3	72	3	50	Yes
	CO2	77	3	76	3	77	3	83	3	78	3	50	Yes
	CO3	75	3	78	3	76	3	82	3	78	3	50	Yes
	CO4	78	3	84	3	81	3	82	3	81	3	50	Yes
	CO5	82	3	74	3	78	3	83	3	79	3	50	Yes
Interfacial Science & Engineering CHE371	CO1	45	2	53	2	50	2	85	3	57	2.2	50	Yes
	CO2	48	2	53	2	50	2	85	3	57	2.2	50	Yes
	CO3	48	2	53	2	53	2	85	3	59	2.2	50	Yes
	CO4	48	2	53	2	53	2	85	3	59	2.2	50	Yes
Found at.	CO1	91	3	44	2	100	3	81	3	96	3	50	Yes

	CO2	97	3	100	3	100	3	81	3	96	3	50	Yes
	CO3	94	3	94	3	94	3	81	3	91	3	50	Yes
	CO4	100	3	100	3	100	3	81	3	96	3	50	Yes
	CO5	100	3	100	3	100	3	81	3	96	3	50	Yes
Management and Economics of Chemical Processes CHE481	CO1	79	3	64	3	75	3	86	3	77	3	50	Yes
	CO2	73	3	63	3	71	3	86	3	74	3	50	Yes
	CO3	100	3	51	3	76	3	86	3	78	3	50	Yes
	CO4	100	3	44	3	72	3	86	3	75	3	50	Yes
Biochemistry and Molecular Biology CHE440	CO1	64	3	52	2	58	2	83	3	63	3	60	Yes
	CO2	67	3	69	3	68	3	83	3	71	3	60	Yes
	CO3	74	3	55	2	65	3	83	3	68	3	60	Yes
	CO4	85	3	50	2	68	3	83	3	71	3	60	Yes
	CO5	100	3	56	2	78	3	83	3	79	3	60	Yes
Project CHE499	CO1	100	3	94	3	97	3	85	3	95	3	60	Yes
	CO2	100	3	92	3	92	3	85	3	91	3	60	Yes
	CO3	100	3	83	3	92	3	85	3	91	3	60	Yes
	CO4	100	3	83	3	92	3	85	3	91	3	60	Yes
	CO5	100	3	95	3	97	3	85	3	95	3	60	Yes

3.3 Attainment of Program Outcomes and Program Specific Outcomes (75)

3.3.1 Describe assessment tools and processes used for measuring the attainment of each Program Outcome and Program Specific Outcomes (10)

The PO/PSO attainment is computed through direct and indirect. The direct part is computed through the attainment of COs from all courses, using the Course Articulation Matrix (CAM). The indirect attainments of the POs are computed through survey among stakeholders as shown in Figure 3.3.1.

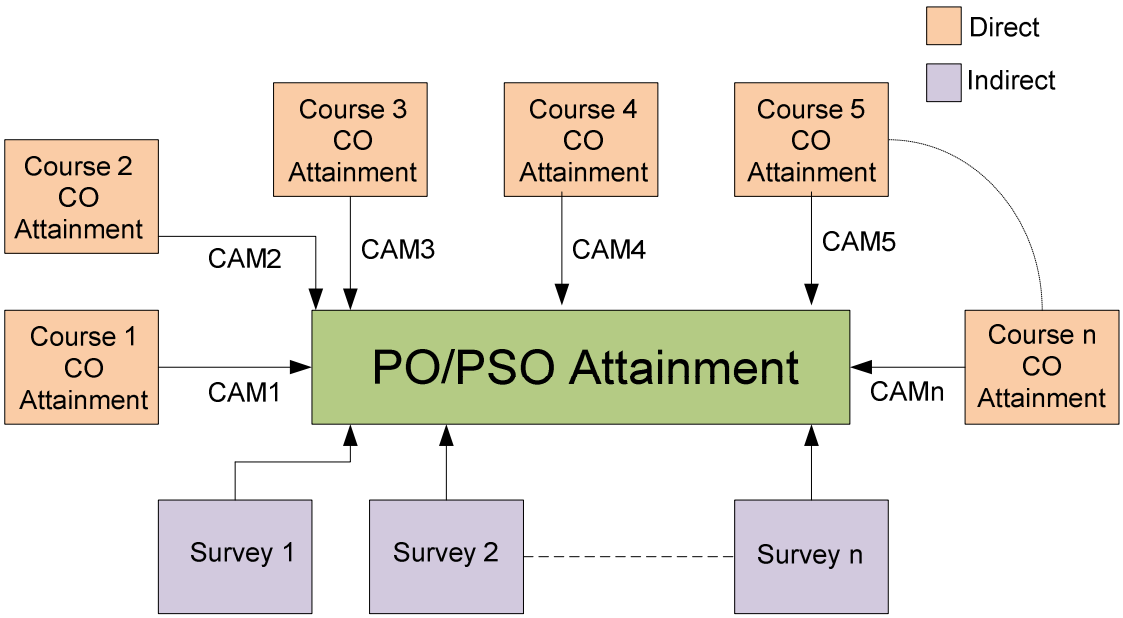


Figure 3.3.1. PO/PSO attainment

3.3.2 Provide results of evaluation of each PO & PSO (65)

PO/PSO Attainment is Computed based on the following expressions

Direct	**Attainment of PO/PSO through a Course:** PO_{ij} Attainment = $\frac{\sum_{k=1}^{COmax} CA_k * CAM_{ik}}{\sum_{k=1}^{COmax} CAM_{ik}}$ Where, PO_{ij} is the Attainment of 'i' th PO through the course 'j' CO_{max} is the maximum number of COs in the course 'j' C_A is Course Attainment CAM_{ik} is the Course Articulation matrix for the 'i' th PO for the course 'j' with 'k' COs **Attainment of PO/PSO through all courses** PO_i Attainment = Average across all Courses Addressing that POs/PSOs
Indirect	**Based on Survey** $PO_i = \frac{\sum_{i=1}^{5} i * no.of\ students\ gave\ i\ option}{5 * no.of\ responses}$ Where, PO_i is the attainment of the 'i'th PO

PO Attainment

Table B.3.3.2a **PO -PSO Attainment- Direct method (2014-2018 Batch)**

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Academic Year 2015-2016 (odd/even)																
2010 curriculum																
Integral Transforms and Complex Analysis	MAT211	1.9	2.0	2.0										2		
Introduction to Chemical Engineering	CHE210	3	3	3	3									3	3	
Fluid Mechanics	CHE211	2	2	2	2	-	-	-	-	-	-	-	-	2	2	2
Inorganic Chemical Technology	CHE220	2.7	2.7	2.8	2.6	-	2.7	2.5	2.7	-	-	2.7	-	2.7	2.7	2.8

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Inorganic and Physical Chemistry	CHE240	2.3	2.3	2.1	2.0	3.0	3.0	2.2	-	-	-	-	2.3	2.3	2.5	2.3
Inorganic and Physical Chemistry Lab	CHE290	3	3	3	3	3	-	-	-	3	-	-	3	3	3	3
Fluid Mechanics Lab	CHE291	3	3	3	3	-	-	-	3	3	3	-	-	3	3	3
Indian Classics for 21st Century	HUM250						2.6		2.6	2.6	2.6	2.6	2.6			
Understanding science of food and nutrition	HUM259		3	3			3	3	3	3	3	3	3			
Psychology for Effective living	HUM257						2.3	2.1	2.6	2.6	2.6	2.0	2.1			

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Glimpses of Eternal India	HUM252						2.6		2.6	2.6	2.6	2.6	2.6			
Psychology for Engineers	HUM256						2.6	2.6	2.6	2.6	2.6	2.6	2.6			
Mathematical Statistics and Numerical Methods	MAT212	3	3	3												
Chemical Engineering Thermodynamics	CHE212	3	3	3	3									3	3	
Heat Transfer in Chemical Engineering	CHE213	3	3	3	3	-	-	3	-	-	-	-	-	3	3	3
Mechanical operations	CHE221	2.4	2.5	2.6	2.3	-	2.4	2.0	2.3	-	-	2.3	-	2.4	2.5	2.5

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Materials Science and Strength of Materials	CHE241	2.6	2.6	2.6	2.7	-	-	-	-	-	-	-	-	2.6	2.7	2.6
Strength of Materials lab	CHE292	3	3	3	3	-	-	-	-	3	-	-	-	3	3	3
Mechanical Operations lab	CHE293	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
Soft Skills I	SSK111	-	3	-	3	-	-	-	3	3	3	3	3	-	-	-
Electrochemical Energy Systems	CHY271	2.2	2.6													
Academic Year 2016-2017 (odd/even)																
2010 Curriculum																
Diffusional Mass Transfer Operations	CHE310	2.7	2.7	2.7	2.7									2.7	2.7	2.7

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Chemical Reaction Engineering	CHE311	2.2	2.2	2.2	2.4	2.3							2	2.2	2.2	2.2
Organic Chemical Technology	CHE320	3	3	3	3	-	3	3	3	-	-	-	-	3	3	3
Advanced Topics in Chemical Engineering	CHE330	3	3	3	3	3	3	3	3	3	3		3	3	3	3
Environmental Studies	ENV200	2.9	2.9	2.9	2.9			3						2.9	2.9	2.9
Chemical Technology Lab	CHE390	3	3	-	3	3	-	-	-	3	3	-	-	3	3	3
Heat Transfer Lab	CHE391	3	3	3	-	-	-	-	3	3	3	3	-	3	3	3
Hindi	15HIN101									3	3					
SOFT SKILLS II	SSK112	-	1	-	1	-	-	-	-	2	1.8	3	1.7	-	-	-
Green chemistry & technology	CHY264	3	3	3	-	3	-	3	-	-	-	-	3	3	3	3

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Instrumental method of Analysis	CHY259	3	3	3	-	3	-	-	-	-	-	-	-	3	3	3
Equilibrium Staged Operations	CHE312	3	3	3	3					3				3	3	
Computational Methods in Chemical Engineering	CHE313	3	3		3	3								3	3	3
Process Dynamics and Control	CHE331	3	3	3	3	3	3							3	3	3
Mass Transfer lab	CHE392	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
Chemical Reaction Engineering lab	CHE393	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
Seminar	CHE397	3	3	3	3	3	3	3	3	3	3		3	3	3	3
Soft Skills III	SSK113	-	2	-	2	-	-	-	3	2.6	2.4	-	2.3	-	-	-

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Chemistry of Engineering Materials	CHY251	3	3	3	-	3	-	3	-	-	-	3	3	3	3	3
Petroleum Refining and Petrochemical Technology	CHE352	3	3	3	3		3	3		3				3	3	
Polymer material Rheology	CHE372	3	3	3	3	3	3	3	-	3	-	-	3	3	3	3
Academic Year 2017-2018 (odd/even)																
2010 Curriculum																
Environmental Engg for Process Industries	CHE400	3	3	3	3	-	3	3	3	-	-	3	-	3	3	3
Transport Phenomena	CHE410	2.2	2.2	2.2	2.2					2.2				2.2	2.2	

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Process Equipment Design and Drawing	CHE430	3	3	3	-	-	3	-	-	3	-	-	-	3	3	3
Principles of Management	MNG400	2.9	2.9	2.9	2.9	3.0	2.8	3.0	2.8	2.9	2.9	2.9	2.9	-	-	-
Computer Aided Design Lab	CHE490	3	3	-	-	3	-	3	-	3	-	-	-	3	3	3
Chemical Process Control Lab	CHE491	3	3	-	3	3	-	-	-	3	3	-	-	3	3	3
Modern Separation Methods	CHE351	2.8	2.0	2.7	-	2.0	-	2.5	-	-	-	-	-	2.8	2.0	-
Chemical Process Modelling and Simulation	CHE461	3	3	3	3	0.5	1	1.3		2			3	3	3	3

Course	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Interfacial Science and Engineering	CHE371	2	2	2	2	2		2						2	2	
Foundation of Information Technology	CSE479	3	3	3	3	3			3					3	3	
Management and Economics of Chemical Processes	CHE481	3	3	-	3	3	-	-	-	3	3	-	-	3	3	3
Biochemistry and Molecular Biology	CHE440	2.8	2.8	-	-	-	2.9	2.9	2.9	-	-	-	-	2.8	2.8	2.8
Project	CHE499	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average Direct Attainment level		2.9	2.8	2.9	2.7	2.7	2.8	2.8	3.0	2.8	2.8	3.0	2.8	2.9	2.9	2.9

Table B.3.3.2b **PO -PSO Attainment- Indirect method (2014-2018 Batch)**

Survey 1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
% Attainment	79	77	79	82	77	81	86	88	88	86	81	85	75	72	75
Level	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Table B.3.3.2 c **PO -PSO Attainment- Overall Attainment (2014-2018 Batch)**

PO & PSO / Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Direct Attainment	2.9	2.8	2.9	2.7	2.7	2.8	2.8	3.0	2.8	2.8	3.0	2.8	2.9	2.9	2.9
Indirect Attainment	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Overall (80% Direct +20% Indirect)	2.9	2.8	2.9	2.8	2.8	2.9	2.8	3	2.9	2.9	3	2.8	2.9	2.9	3

From Table B 3.3.2 c, high level of attainment (close to level 3) is seen across all the POs and PSOs. Additional details are presented in Criterion 7.

CRITERION 4: Students' Performance (100)

Table B.4a - Sanctioned intake and Total number of students admitted

Item (Information to be provided cumulatively for all the shifts with explicit headings, wherever applicable)	CAY (2018)	CAYm1 (2017)	CAYm2 (2016)
Sanctioned intake of the program (N)	69	69	69
Total number of students admitted in first year minus number of students migrated to other programs/institutions, plus no. of students migrated to this program (N1)	53	57	43
Number of students admitted in 2nd year in the same batch via lateral entry (N2)	0	0	0
Separate division students, if applicable (N3)	N/A	N/A	N/A
Total number of students admitted in the Program (N1 + N2 + N3)	53	57	43

CAY – Current Academic Year

CAYm1- Current Academic Year minus1= Current Assessment Year
CAYm2 - Current Academic Year minus2=Current Assessment Year minus 1 LYG – Last Year Graduate minus 1
LYGm1 – Last Year Graduate minus 1 LYGm2 – Last Year Graduate minus 2
*There is a discrepancy in the number of students in AY 2016 between this table and the pre-qualifier, because students could have discontinued from the program or could have left Amrita

Table B.4b - Number of students who have successfully graduated without backlogs in any semester/year of study

Year of entry	N1 + N2 + N3 (As defined above)	Number of students who have successfully graduated without backlogs in any semester/year of study (Without Backlog means no compartment or failures in any semester/year of study)			
		I Year	II Year	III Year	IV Year
CAY (2018)	53				
CAYm1 (2017)	57	40			
CAYm2 (2016)	43	42	36		
CAYm3 (2015)	60	52	42	45	
CAYm4 (LYG) (2014)	65	57	57	54	60
CAYm5 (LYGm1) (2013	60	43	50	51	57
CAYm6 (LYGm2) (2012)	42	31	34	39	39

Table B.4c - Number of students who have successfully graduated in stipulated period of study

Year of entry	N1 + N2 + N3 (As defined above)	Number of students who have successfully graduated (Students with backlog in stipulated period of study)			
		I Year	II Year	III Year	IV Year
CAY (2018)	53				
CAYm1 (2017)	57	17			
CAYm2 (2016)	43	1	7		
CAYm3 (2015)	60	8	17	15	
CAYm4 (LYG) (2014)	65	8	8	11	5
CAYm5 (LYGm1) (2013)	60	17	10	9	3
CAYm6 (LYGm2) (2012)	42	11	8	3	3

4.1. Enrolment Ratio (20)

Enrolment Ratio= N1/N

Table B.4.1 - Enrolment ratio

Average enrollment of past three years from current year =	(57+43+60)/3 =	51
Enrollment ratio (N1/N) *100 =	(51*100)/69=	74 %

Item (Students enrolled at the First Year Level on average basis during the previous three academic years starting from current academic year)	Marks
>=90% students enrolled	20
>=80% students enrolled	18
>=70% students enrolled	16
>=60% students enrolled	14
Otherwise	0

4.2. Success Rate in the stipulated period of the program (20)

4.2.1. Success rate without backlogs in any semester/year of study (15)

SI= (Number of students who have graduated from the program without backlog)/(Number of students admitted in the first year of that batch and actually admitted in 2nd year via lateral entry and separate division, if applicable)
Average SI = Mean of Success Index (SI) for past three batches
Success rate without backlogs in any semester/year of study = 15 × Average SI

Table B.4.2.1 - Success rate without backlogs in any semester/year of study

Item	Last Year of Graduate , LYG (2014)	Last Year of Graduate minus 1, LYGm1 (2013)	Last Year of Graduate minus 2, LYGm2 (2012)
Number of students admitted in the corresponding First Year + admitted in 2nd year via lateral entry and separate division, if applicable	65	60	42
Number of students who have graduated without backlogs in the stipulated period	52	42	27
Success Index (SI)	0.8	0.7	0.64

4.2.2. Success rate with backlog in stipulated period of study (5)

SI= (Number of students who graduated from the program in the stipulated period of course duration)/ (Number of students admitted in the first year of that batch and actually admitted in 2nd year via lateral entry and separate division, if applicable)

Average SI = mean of Success Index (SI) for past three batches

Success rate = 5 × Average SI

Note: If 100% students clear without any backlog then also total marks scored will be 20 as both 4.2.1 & 4.2.2 will be applicable simultaneously

Table B.4.2.2 - Success rate with backlog in stipulated period of study

Item	Last Year of Graduate, LYG (CAY 2018-19)	Last Year of Graduate minus 1, LYGm1 (CAYm1 2017-18)	Last Year of Graduate minus 2, LYGm2 (CAYm2 2016-17)
Number of students admitted in the corresponding First Year + admitted in 2nd year via lateral entry and separate division, if applicable	65	60	42
Number of students who have graduated with backlogs in the stipulated period	8	15	12
Success Index (SI)	0.12	0.25	0.29
Average Success Index	0.22		

4.3. Academic Performance in Second Year (10)

Academic Performance = Average API (Academic Performance Index), where

API = ((Mean of 2nd Year Grade Point Average of all successful Students on a 10 point scale) or (Mean of the percentage of marks of all successful students in Second Year/10)) x (number of successful students/number of students appeared in the examination)

Successful students are those who are permitted to proceed to the Third year.

Table B.4.3 - Academic Performance in Second Year

Academic Performance	CAY (2018-19)	CAYm1 (2017-18)	CAYm2 (2016-17)
Mean of CGPA or Mean Percentage of all successful students (X)	7.6	7.27	7.61
Total no. of successful students (Y)	43	60	65
Total no. of students appeared in the examination (Z)	43	60	65
API = X* (Y/Z)	7.6	7.27	7.61
Average API = (AP1 + AP2 + AP3)/3	7.49		

4.4. Placement, Higher Studies and Entrepreneurship (30)

Assessment Points = 30 × average placement

Table B.4.4

Placement, Higher Studies and Entrepreneurship (30)			
Item	CAYm1	CAYm2	CAYm3
Total No. of Final Year Students (N)	64	60	42
No. of students placed in companies or Government Sector (x)	18	26	30
No. of students admitted to higher studies with valid qualifying scores (GATE or equivalent State or National Level Tests, GRE, GMAT etc.) (y)	12	4	5
No. of students turned entrepreneur in engineering/technology (z)	0	0	0
x + y + z =	30	30	35
Placement Index : (x + y + z)/N	0.47	0.5	0.83
Average placement= (P1 + P2 + P3)/3			0.60
Assessment Points = 30 × average placement			18.02

4.4a. Provide the placement data in the below mentioned format with the name of the program and the assessment year:

Table B.4.4a

Sl.No	Name of student placed	Enrollment Number	Name of the Employer	Appointment Reference Letter
B.Tech Chemical 2014-2018 Batch				
1	ABINAV OMKARNATH S	CB.EN.U4CHE14002	Accenture	Dt. 15th Feb 2018
2	T AKHIL	CB.EN.U4CHE14003	Federal Bank	Date: Jul 3, 2018
3	AKSHAYA E M	CB.EN.U4CHE14006	CUMI	Dt. 25th January 2018
4	BALAJI S	CB.EN.U4CHE14011	TCS	Ref: TCSL/ Dt. 06/10/2017
5	DURGASREE R	CB.EN.U4CHE14016	Accenture	Dt. 15th Feb 2018
6	GOPIKA KRISHNAKUMAR	CB.EN.U4CHE14020	FLSMIDTH	Date: April 24, 2018
7	JISHNU K	CB.EN.U4CHE14025	CUMI	Dt. 25th January 2018
8	R NAMITHA	CB.EN.U4CHE14033	Infosys	HRD/3T/18-19/
9	PALANIAPPAN R	CB.EN.U4CHE14035	Accenture	Dt. 15th Feb 2018
10	PARITALA RAGA SREEHITHA	CB.EN.U4CHE14036	Infosys	HRD/3T/18-19/
11	PRADEEP K	CB.EN.U4CHE14040	Infosys	HRD/3T/18-19/
12	REJO RADHAKRISHNAN	CB.EN.U4CHE14046	Accenture	Dt. 15th Feb 2018
13	SATHISH KUMAR A	CB.EN.U4CHE14052	Accenture	Dt. 15th Feb 2018
14	V SHENBAGAVALLI	CB.EN.U4CHE14055	TCS	Ref: TCSL/ Dt. 06/10/2017
15	SOWMYA C F	CB.EN.U4CHE14058	Infosys	HRD/3T/18-19/
16	J SUBASINI	CB.EN.U4CHE14059	TCS	Ref: TCSL/ Dt. 06/10/2017
17	TAMILARASAN T	CB.EN.U4CHE14062	Infosys	HRD/3T/18-19/
18	VINAYAKRAM T S	CB.EN.U4CHE14068	TCS	Ref: TCSL/ Dt. 06/10/2017
2013-2017 Batch				

Sl.No	Name of student placed	Enrollment Number	Name of the Employer	Appointment Reference Letter
B.Tech Chemical 2014-2018 Batch				
1	Adarsh Ramesh	CB.EN.U4CHE13002	Amazon-CS	Date: 9th Jan 2017
2	Aishwarya Lakshmi S	CB.EN.U4CHE13003	CTS	Dt. 8th Dec 2016
3	Anusha R	CB.EN.U4CHE13005	CTS	Dt. 8th Dec 2016
4	Ashwini U Menon	CB.EN.U4CHE13008	FIITJEE	Ref: Chemistry/2017004160, Dt. 28.03.2017
5	Balamurali S E	CB.EN.U4CHE13012	Thirumalai Chemicals Ltd.	Date: April 8, 2017
6	Divya R	CB.EN.U4CHE13018	CTS	Dt. 8th Dec 2016
7	Gangatharan M	CB.EN.U4CHE13019	Gofrugal - MMS/ Berger Paints	Dt.08.03.2017
8	E Harshita	CB.EN.U4CHE13020	Amazon-CS	Date: 9th Jan 2017
9	Kaushik Ganesan	CB.EN.U4CHE13022	CTS/FLSmidth	Date: January 12, 2017
10	E R Lakshmi Narayanan	CB.EN.U4CHE13023	CTS	Dt. 8th Dec 2016
11	Mythili Ananth	CB.EN.U4CHE13026	Infosys	HRD/3T/16-17/
12	Nandhini G R	CB.EN.U4CHE13027	Federal Bank	Date: 15th March 2017
13	S Nandita	CB.EN.U4CHE13028	Infosys	HRD/3T/16-17/
14	Naveen Balaji N	CB.EN.U4CHE13029	Amazon-CS	Date: 9th Jan 2017
15	Nidhin T Madhu	CB.EN.U4CHE13031	Infosys/ Cumi	Dt. 15th Feb 2017
16	Pavithra R	CB.EN.U4CHE13032	FLSmidth	Date: January 12, 2017
17	Pooja A	CB.EN.U4CHE13034	CTS	Dt. 8th Dec 2016
18	Prakash M	CB.EN.U4CHE13036	SPIC	Date: May 15, 2017
19	Praveen S	CB.EN.U4CHE13037	Infosys	HRD/3T/16-17/
20	Ramya P	CB.EN.U4CHE13039	FIITJEE	Ref: Chemistry/2017004160 Dt. 28.03.2017
21	R Roshan Shrivatsav	CB.EN.U4CHE13042	TCS	Ref: TCSL/ Dt. 07/12/2016
22	Sanganathan A	CB.EN.U4CHE13043	SPIC	Date: May 15, 2017
23	Sanha Kaizer Tajamul Basha	CB.EN.U4CHE13044	CTS	Dt. 8th Dec 2016

Sl.No	Name of student placed	Enrollment Number	Name of the Employer	Appointment Reference Letter
B.Tech Chemical 2014-2018 Batch				
24	S Sruthi	CB.EN.U4CHE13050	CTS	Dt. 8th Dec 2016
25	Subeesh Kannan P	CB.EN.U4CHE13051	CTS/ SPIC	Date: May 15, 2017
26	Vignesh Mahalingam	CB.EN.U4CHE13059	CTS/ Cumi	Dt. 15th Feb 2017
2012-2016 Batch				
1	ABHINAV N R	CB.EN.U4CHE12001	Cognizant	Dt. 06-Apr-2016
2	Abhiram Ashok	CB.EN.U4CHE12002	Cognizant	Dt. 06-Apr-2016
3	ANJANA SURESH	CB.EN.U4CHE12003	Cognizant	Dt. 06-Apr-2016
4	ARVIND RAVINDIRAN	CB.EN.U4CHE12006	Cognizant	Dt. 06-Apr-2016
5	B R CHANAKYA	CB.EN.U4CHE12009	Cognizant	Dt. 06-Apr-2016
6	T DEEPAK	CB.EN.U4CHE12010	AMRAN Establishment L.L.C	Dt.01-Dec-2016
7	GARIMELLA LAKSHMI GOWTHAM	CB.EN.U4CHE12011	Cognizant	Dt. 06-Apr-2016
8	HARITHA M	CB.EN.U4CHE12012	Cognizant	Dt. 06-Apr-2016
9	HARITHA P S	CB.EN.U4CHE12013	Cognizant	Dt. 06-Apr-2016
10	KARTHIKA PRASHANTH PATTATH	CB.EN.U4CHE12016	Cognizant	Dt. 06-Apr-2016
11	KRISHNAA SURESH	CB.EN.U4CHE12018	Cognizant	Dt. 06-Apr-2016
12	C MOHAMMED ASEEB	CB.EN.U4CHE12020	INFOSYS	Ref:HRD/3T/16-17/
13	N S NAGAARJUN	CB.EN.U4CHE12021	Cognizant	Dt. 06-Apr-2016
14	NAGURU PHANI PAVAN KUMAR REDDY	CB.EN.U4CHE12022	TCS	TCSL/CT201517.., Dt.23.09.2015

Sl.No	Name of student placed	Enrollment Number	Name of the Employer	Appointment Reference Letter
B.Tech Chemical 2014-2018 Batch				
15	POKURI ANNAPOORNA POOJA	CB.EN.U4CHE12024	Cognizant	Dt. 06-Apr-2016
16	Prabhav Santosh Menon	CB.EN.U4CHE12025	Cognizant	Dt. 06-Apr-2016
17	RAHUL RAJAN BABU	CB.EN.U4CHE12026	Cognizant	Dt. 06-Apr-2016
18	Revathy Nair	CB.EN.U4CHE12027	Cognizant	Dt. 06-Apr-2016
19	SAMIK SEN	CB.EN.U4CHE12028	SPIC	Date: February 22, 2016
20	SHASHANK SURESH	CB.EN.U4CHE12030	Sanmar Engg	Date: June 15, 2016
21	SHOBANA M	CB.EN.U4CHE12031	Cognizant	Dt. 06-Apr-2016
22	M SHOBHANA MEENAKSHI	CB.EN.U4CHE12032	Cognizant	Dt. 06-Apr-2016
23	C SIVARAMAKRISHNAN	CB.EN.U4CHE12033	SPIC	Date: February 22, 2016
24	SREEDHAR HARIGOVIND	CB.EN.U4CHE12034	INFOSYS	Ref:HRD/3T/16-17/
25	SREEJAYA K H	CB.EN.U4CHE12035	Cognizant	Dt. 06-Apr-2016
26	SREEVATHSAN S	CB.EN.U4CHE12036	Cognizant	Dt. 06-Apr-2016
27	SRI NITHYA RUPINEA	CB.EN.U4CHE12037	Cognizant	Dt. 06-Apr-2016
28	SRIRAG RAMACHANDRAN	CB.EN.U4CHE12038	Cognizant	Dt. 06-Apr-2016
29	SUBHIKSHA R	CB.EN.U4CHE12039	Cognizant	Dt. 06-Apr-2016
30	VIGNESH S	CB.EN.U4CHE12044	Cognizant	Dt. 06-Apr-2016

4.5. Professional Activities (20)

4.5.1. Professional societies/chapters and organizing engineering events (5)

Table 4.5.1a

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity	Remarks
2016-2017	IIChe	Guest lecture	Shri.Susil Kumar,Formerly President,Dahej Petrochemical division,Reliance Industries Limited and later President,GMS,Reliance Industries Ltd,Mumbai,delivered a talk on Water Conservation on 17th February2017,	
2016-2017	IIChe	Hands on Workshop	National level hands on Workshop on Nanomaterials and Nanotechnology(30th January 2017-4th February 2017) organized by Department of Chemical Engineering and Materials Science	
2016-2017	IIChe	Guest lecture	National Seminar on Design of Curiculum for Sustainable and Societal Development at Amrita Viswa Vidyapeetham,12th August 2016,Coimbatore Campus	
2016-2017	IIChe	Guest lecture	Dr.S Sakthivel ,Team Leader,Centre for Solar Energy Materials,International Advanced Research Centre for Powder Metallurgy and New Materials,Balapur PO,Hydrebad delivered a talk on "Important role of functional materials and coatings for concentrated solar thermal power (CSP) and amp:PV applications on 26th October 2016	
2015-2016	IIChe	Guest lecture	Guest lecture by Dr.R.V Subba Rao,Superintendent,Laboratory operations,Reprocessing Plant Operations Division,Reprocessing Group,IGCAR,Kalpakkam on Chemical Engineering Technologiesfor nuclear fuel cycle on 22nd March 2016	
2015-2016	IIChe	Guest lecture	Dr.Joseph Smith of Missouri Institute of Science and Technology delivered an invited talk to students of Chemical Engineeering on 6th August 2015	

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity	Remarks
PETROTECH SOCIETY				
2017-18	FIPI / Petrotech	Hands-on Workshop on Process Simulation	As part of ANOKHA, a 3 day hands-on workshop was conducted by the FIPI Student Chapter of Amrita Vishwa Vidyapeetham during 22-24th February, Nearly 25 students from other colleges had participated in the workshop. The Resource person was Dr. Udaya Bhaskar Reddy Ragula, Associate Professor, Department of Chemical Engineering and Materials Science.	The software is available with Amrita. The conduct of the course was really appriciated by the participants, as the pedogogy of teaching the course is completely different.
ISAMPE				
2012-'13	Indian Society for the Advancement of Materials and Process Engineering (ISAMPE)-Coimbatore Chaper	INCCOM-11 (National Conference on Composites)	The Eleventh ISAMPE National Conference on Composites was conducted at Amrita Vishwa Vidyapeetham, Coimbatore during November 2 and 3, 2012.The conference was inaugurated by the Chief Guest Dr. J . Narayana Das ,Chief Controller (R&D) and Outstanding Scientist, DRDO. Dr.M.P.Chandrasekharan, Dean-Engineering, Amrita Vishwa Vidyapeetham presided over the function. Prof.R.Subba Rao,Chairman-Organizing Committee INCCOM 11 welcomed the gathering.Dr. K. Vijayaraju, President ISAMPE gave the felicitation speech. Shri M K Sridhar, Adviser (M&A) and Head – Materials Science Division, National Aerospace Laboratories gave the Key note Lecture on Development of Carbon Fibres from PAN indigenously. Dr.K.Jayanarayanan, Convener-INCCOM 11 proposed the vote of thanks. The inaugural session was graced by Dr. R V Krishnan, Dr. Sankaran, Shri TM Naidu former Presidents of ISAMPE and the invited speakers viz. Prof. B. Dattaguru	

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity	Remarks
			(IISc,Bangalore), Dr.RMVGK Rao, Shri M Subba Rao (TAML,Bangalore), Dr. Packirisamy (VSSC),Prof. Sabu Thomas (Mahatma Gandhi University), Prof. Kuruvilla Joseph (IIST-Thiruvananthapuram), Prof. R. Velmurugan (IIT-M), Dr. CM Manjunath (NAL,Bangalore), Dr Pavankumar (NAL,Banglaore)r, Dr. Bhaskar Patham (General Motors, Bangalore) and Shri A Rajajrajan (VSSC).Over 90 delegates registered for the conference. A total of 11 invited talks and 40 contributory papers were presented. A cultural programme was arranged in the evening of the first day of the conference followed by dinner. A Panel discussion was conducted during the valedictory function, the topic being “Carbon fibre and Carbon Nanotubes composites for the next decade”, Dr.RMVGK Rao, Shr.M.Subba Rao, Dr. Packirisamy, Dr. Pavankumar were the panel members. Prof. R. Subba Rao moderated the discussion.	
2016-'17	Indian Society for the Advancement of Materials and Process Engineering (ISAMPE)-Coimbatore Chaper	Support for workshop	ISAMPE Coimbatore Chapter gave financial support to the National Level Hands-On Workshop On Nanomaterials and Nanocomposites held from 30th January 2017 to 4th February 2017 0rganized by Centre of Excellence in Advanced Materials & Green Technologies, Department of Chemical Engineering and Department of Electrical and Electronics Engineering, Amrita School of Engineering, Coimbatore. . The following ISAMPE members were resource persons for the workshop and they delivered lectures in their area of expertise.1. Prof. Sriram Devanathan 2. Dr. K. Jayanarayanan 3. Dr. Meera Balachandran 4. Dr, Murali Rangarajan	

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity	Remarks
			5. Dr. Nikhil Kothurkar 6. Dr. Duraisamy Kumaresan	
2017-18	ISAMPE	Guest lecture by Dr. K. Kalyanasundaram	A guest lecture was delivered on "Recent developments in third generation photovoltaics"	

Table 4.5.1b

Conferences/Seminars/Workshops organized by the department				
Academic year	**Name of conference/seminar/workshop**	**Name of the activity**	**Detail description of activity**	**Organizer**
2016-2017	National Conference on Curriculum Design for Sustainable and Societal Development		12-13 August 2017	AMRITA and NAAC
2016-2017	High profile panel discussion organized by MA Math & Amrita Vishwa Vidyapeetham "Making Sustainability a Reality: from Policy to Successful Practice", 25th September 2016			Amrita Vasudha (Sustainability Initiative for Amrita Vishwa Vidyapeetham)

Conferences/Seminars/Workshops organized by the department				
Academic year	**Name of conference/seminar/workshop**	**Name of the activity**	**Detail description of activity**	**Organizer**
2016-2017	National Level Hands-on Workshop on Nanomaterials and Nanocomposites		Hands-on Workshop on Nanomaterials and Nanocomposites from January 30th – February 4th, 2017	Center of Excellence in Advanced Materials and Green Technologies, Dept. of Chemical Engineering & Materials Science and Dept. of Electrical and Electronics Engineering, supported by IETE and ISAMPE
2016-2017	Two – day "IANCAS – Radioactivity workshop"		Workshop with hands-on components conducted by research scientists at IGCAR for UG and PG level students 2-3 March 2017 at ANOKHA 2017	AMRITA and IANCAS
2017-2018	Two day tutorial workshop on Photovoltaic Solar Energy Harvesting Applications	Resource person: Dr. K. Kalyanasundaram, EPFL Switzerland	11-12th September 2017	Amrita and ISAMPE
2014-2015	One day Hands on training cum tutorial workshop on Solar Photovoltaic Energy Conversion	Resource person: Dr. K. Kalyanasundaram, EPFL Switzerland	30th September 2014	Amrita

Conferences/Seminars/Workshops organized by the department				
Academic year	**Name of conference/seminar/workshop**	**Name of the activity**	**Detail description of activity**	**Organizer**
	and Storage Applications			

4.5.2. Publication of technical magazines, newsletters, etc. (5)

The Envision newsletter is published to provide detailed research activities at global and national level carried by amrita faculty. This newsletter highlights the achievements of faculty across broader zone of research and academic excellence achieved in their respective fields. The newsletter covers the societal each by amrita faculty by highlighting the contributions towards betterment of society and projects carried towards achieving this goal. AmritaDhwani – an annual magazine and the Amritarpan newsletter are published by the University.

4.5.3 Participation in inter-institute events by students of the program of study (10)

Table 4.5.3a

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2015-2016	International Conference on Advanced Materials,SCICON'16,Coimbatore,19-21December 2016,Organized by Department of Sciences,Amrita Vishwa Vidyapeetham, Coimbatore	Influence of multiscale fillers on the mechanical, transport and rheological properties of Polypropylene	Malavika D,Aparna R,Deepak T,Haritha P S	Best Paper Award,Conference Proceedings published by:BONFRING Intellectual Integrity

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2015-2016	International Conference on Macromolecules : Synthesis, Morphology, Processing, Structure, properties and Applications ICM 201613th – 15th May 2016 Organized by International Unit on Macromolecular Science and Engineering (IUMSE), Mahatma Gandhi University, Kottayam, Kerala, India Conference Venue: School of Chemical Sciences, Mahatma Gandhi University, Kottayam ,	Simulation studies on Electric field propagation in cross-linked Polyethylene Nanosilica Composites	Anjana Suresh, Karthika Pattath, Asseb C. Mohammed	Proceedings Published By: Apple Academic Press
2015-16	AIChE Annual Meeting 2015, Salt Lake City, Utah, USA, November 2015	Modeling of Drying Stage in a Bubbling Fluidized Bed Coal Gasifier	Karthik Chidambaram, Rameshwar Vedachalam, Swati Achra	Proceedings Published by American Institute of Chemical Engineers (AIChE)

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2016-2017	International Conference on Advances in Materials and Manufacturing Applications,ICONAMMA 2017,17th-19th August 2017, Organized by the Department of Mechanical Engineering,Amrita Vishwa Vidyapeetham, Bangalore	Effect of compatibilizer and carbon nanotubes on blends of Polypropylene and Nylon '6	Anjali Suresh,Aishwarya Lakshmi S,Neeraja Sethuraman,Ashwin Vinod	Conference Proceedings published
2016-2017	International Conference on Advances in Materials and Manufacturing Applications,ICONAMMA 2017,17th-19th August 2017, Organized by the Department of Mechanical Engineering,Amrita Vishwa Vidyapeetham, Bangalore	Cure and Degradation Kinetics of Sulfur Cured Nanocomposites of EPDM-NBR Rubber Blends	Sanha Kaizer Tajamul Basha, Divya R, Ashwini U Menon	Conference Proceedings published

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2015-2016	International Conference on Macromolecules : Synthesis, Morphology, Processing, Structure, properties and Applications ICM 2016 organized by International Unit on Macromolecular Science and Engineering (IUMSE), Mahatma Gandhi University, Kottayam, Kerala, India held at School of Chemical Sciences, Mahatma Gandhi University, Kottayam, pp 27, 13th – 15th May 2016	Simulation studies on Electric field propagation in cross-linked Polyethylene Nanosilica Composites	Anjana Suresh, Karthika Pattath, Asseb C. Mohammed	Conference Proceedings published
2015-2016	International Conference on Recent Advances in Nano Science and Technology 2015 (RAINSAT-2015) organized by Sathyabama University in association with	Simulation of electric field distribution in nanodielectrics based on XLPE	ArjunJayakrishnan, Kavitha D, Arthi A, NivedithaNagarajan	Conference Proceedings published

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
	CSIR – Central Leather Research Institute at Sathyabama University, Chennai, pp 54, 8th – 10th July 2015			
2016-2017	AIChE Annual Meeting 2016, San Francisco, California, USA, November 2016	Modeling of Fischer-Tropsch Synthesis in Microchannel Reactor	Arun Meyappan Venkatachalam, Sri Nithya Rupine Anbarasu	Proceedings Published by American Institute of Chemical Engineers (AIChE)
2017-2018	International Conference on Advance Materials for Technological Applications (ICAM-18) organized by PSGR Krishnammal College for Women, Coimbatore ,January 3-5, 2018.	Drug Encapsulated Grafted Copolymer for Sustained Release of Nitrendipine – Preliminary Study	Durgasree R, Geeva prasanth A, Sai shruthi B, Sathish kumar A, Sindhu S	Conference Proceedings published
2017-2018	International conference on Advances in Science and Technology(ICAST-18) organized by Swami Keshvanand Institute of Technology,	Preparation and Characterization of Nitrendipine loaded Arylamide Grafted Chitosan blend Microspheres: in vitro drug	Geeva Prasanth A, Sathish Kumar A,Sai Shruthi B,Sindhu S	Conference Proceedings published

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
	Management & Gramothan,Jaipur,May 4-5,2018.	release studies		
2017-2018	International conference on nanotechnology :ideas, innovations & initiatives-2017, IIT Roorkee, Roorkee, India	Highly Crystalline BaTiO3 Nanoparticles/ TiO2 Nanorod Composites for DSSC Photoanode Applications	S. Lakshmi, M. Keerthana, R. Namitha, K. Gopika, G. Baiju, B. Murali	conference proceedings published
2017-2018	9th International Conference on Materials for Advanced Technologies (ICMAT 2017), Singapore.	Solution Processed Bismuth Sulphide (Bi2S3) and Bismuth Sulphide Based Ternary Photoactive Materials for Solar Energy Harvesting	Arjun Moorthy	conference proceedings published
2017-2018	AIChE Annual Meeting 2017, Minneapolis, USA, October - November, 2017	Modeling of Particle Breakage and Dispersion in a Slurry Fischer-Tropsch Reactor	Deekshitha Adapa and Aruna C.M.	Proceedings Published by American Institute of Chemical Engineers (AIChE)
2017-2018	AIChE Annual Meeting 2018, Minneapolis, USA, October-November, 2018	Fischer-Tropsch Synthesis over Alumina Supported Cobalt Catalyst in a Fixed-bed Reactor	Adithyahari Badrinarayanan, Mohammed Muzwar, Pushkala Venkatesh	Proceedings Published by American Institute of Chemical Engineers (AIChE)

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2017-2018	International Conference on Advances in Materials and Manufacturing Applications,ICONAMMA 2017,17th-19th August 2017, Organized by the Department of Mechanical Engineering,Amrita Vishwa Vidyapeetham, Bangalore	Effect of Compatibilizer and Carbon Nanotubes on Blends of Polypropylene and Nylon 6	Anjali Suresh,Aishwarya Lakshmi S,Neeraja Sethuraman,Ashwin Vinod	Conference Proceedings published
2017-2018	Journal of Vinyl and Additive Technology	Mechanical and thermal properties modelling,sorption characteristics of (Multiwalled carbon nanotubes/glass fiber) filler reinforced polypropylene composites	Pavithra RamaKrishnan,Nandhini G,Ramya Paneerselvam,Veeraraghavan V	Published the article(Scopus Indexed)Impact factor:1.13

Table 4.5.3b

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
2015-2016	Annual Convention of Petrotech Chapters	Presentation on "Falling Oil Prices: A Threat or Opportunity to India in Particular and World in General"	1. M. Ganagatharan, Nidhin T. Madhu, Deekshitha Adapa, Mythili Ananth, Sruthi S., Aruna C.M., Mohammed Muzwar, Jishnu, Saran S., Shnabaga Valli.	Receivced Second best runner up for the Petrotech Chapter.
2017	Model united nations conference	IIMMUN	Malavika Raghunathan	Participated in IIT Madras Model United Nations Conference ,2017
2017	Model united nations conference	IIMMUN	Ananthapadmananaban	Participated in Model United Nations-IIMMUN 2K17 ,PSG MUN
2017	Model united nations conference	IIMMUN	Deepak Suresh Varma	Model United Nations :IITMUN 2017
2017	Live in Lab Project	Live in Lab project at Jharkhand	Deepak Suresh Varma	Live in Labs Project at Jarkhand:System design for Integrating technologies for building water-wise communities
2017	Live in Lab Project	Live in Lab project at Jharkhand	Siddharth	Undergoing Live in lab project: System Design for Integrating Technologies for Building waterwise communities,Jarkhand
2018	SITRA Conference	Conference	Harikrishnan	Attended the SITRA

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
				conference on Energy conservation, Coimbatore
2018	Petrotech	FIPI Conclave	Nikhil Ramdoss	Attended FIPI Conclave, UPES, Dehradun,
2018	Petrotech	FIPI Conclave	Prashanth	FIPI –Best student chapter participation
2018	Petrotech	FIPI Conclave	Rashmi N	FIPI Conclave,UPES,Dehradun,Presentation on Future of oil in transportation in India
2018	Petrotech	SITRA Conference	Rashmi N	Participated in SITRA conference Dec 2018on energy conservation
2018	Annual Convention of Petrotech Chapters	Petrotech	Alluri Sharanya	Selected for the 2nd level Chhatra Viswakarma Award 2018
2018	Annual Convention of Petrotech Chapters	FIPI Research Conclave	Alluri Sharanya	Participated in FIPI Research Conclave and presented a technical paper
2018	Annual Convention of Petrotech Chapters	FIPI Petrotech	Alluri Sharanya	Selected to FIPI Petrotech
2018	Annual Convention of Petrotech Chapters	Petrotech Youth Forum	Alluri Sharanya	Youth Forum 2019 and secured Ist prize

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
2018	Annual Convention of Petrotech Chapters	FIPI Petrotech	Lakshmi Yashodara	Selected for second level of Chhatra Viswakarma Award 2018
2018	Annual Convention of Petrotech Chapters	FIPI Research Conclave	Lakshmi Yashodara	Participated in FIPI Research Conclave and presented a paper
2018	Annual Convention of Petrotech Chapters	Petrotech	Lakshmi Yashodara	Attended FIPI Petrotech Youth forum 2019
2018	Annual Convention of Petrotech Chapters	Petrotech	Lakshmi Yashodara	Won third place for the project in entrepreneurship club
2018	Annual Convention of Petrotech Chapters	Petrotech	Hariharan R K	Participated in SITRA conference on “Energy efficiency for a sustainable future
2018	Annual Convention of Petrotech Chapters	Petrotech	Hariharan R K	Selected to regionals of Chaatra Viswakarma Award 2018
2018	Annual Convention of Petrotech Chapters	Petrotech	Hariharan R K	Participated in AICHE conference and Jeopardy event
2018	SITRA Conference	SITRA	Malavika Raghunathan	Participant in SITRA conference: Energy efficiency for a sustainable future,2018

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
2018	AICHE Conference,VIT	AICHE Conference	Nagarajan A R	Attended AICHE conference in VIT,Participated in Jeopardy event (AICHE) at VIT
2018	Petrotech	Petrotech	Niranjan Shenoy	Selected to regionals of AICTE Chhatra Viswakarma Award 2018
2018	AICHE Conference,VIT	AICHE Conference	Niranjan Shenoy	Participated in AICHE conference
2018	AICHE Conference,VIT	AICHE Conference	K Ravishankar	Participated in AICHE conference
2018	AICHE Conference,VIT	AICHE Conference	Sai Maadesh	Participated in AICHE conference
2018	SITRA Conference,Coimbatore	SITRA Conference	Santhoshi	Participated in SITRA conference “Energy efficiency for a sustainable future”,Coimbatore
2018	Technical contest	Paper presentation	S.Sivanesh	Presented a paper in Scientium 2K18 (Symposium in Kongu Engineering College)
2018	SITRA Conference	SITRA Conference	G S K Srinivas	Participated in SITRA International Conference: Energy efficiency

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
				for a sustainable future
2018	AICHE Conference	AICHE Conference	G S K Srinivas	Attended AICHE organized event Jeopardy
2018	Technical contest	Paper presentation	Vaishnavi Sree	Presented a paper in Scientium 2K18 (Symposium in Kongu Engineering College,Erode,Coimbatore)
2018	Technical contest	Paper presentation	Vaishnavi Sree	Presented a paper in International conference on "Mathematical Modelling and Simulation"
2018	Conference	VIT conference	Vijay S	Participated in Cheme Jeopardy at VIT
2018	Petrotech	AICHE Conference	Vishu Pratap	Participated in AICHE convention at VIT university and in Cheme Jeopardy
2018	Petrotech	FIPI Petrotech	Vishu Pratap	Participated in FIPI Petrotech Youth Forum held at Dehradun
2018	Conference	SITRA Conference	Yashwant S	Won the Ist prize for the quiz at SITRA Textile conference
2018	Conference	SIRA Conference	Aishwarya Babu	Participated in SITRA conference on energy conservation for

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
				sustainable future, Coimbatore
2017	Anokha Technical fest	Anokha	Surya Kumar G	Attended workshop on radioactivity organized by IGCAR, Anokha
2017	Anokha Technical fest	Anokha	Soundarya	Attended workshop on Radioactivity organized by IGCAR, Anokha 2017
2017	Anokha Technical fest	Anokha	Kabilesh R	Technical event Techathon Winner ,2018
2017	Anokha Technical fest	Anokha	Jeganath R	Attended radioactivity workshop organized by IGCAR, ANOKHA 2018, Amrita Vishwa Vidyapeetham
2017	Anokha Technical fest	Anokha	Hari Priya	Attended workshop on radioactive chemistry ,Anokha 2018
2017	Anokha Technical fest	Anokha	Deepak Suresh Varma	Participated –in Atomic Chemistry workshop 2017 Anokha
2017	Anokha Technical fest	Anokha	Balaji P	Participated in Workshop organized by IGCAR, Anokha

Inter Institute Events				
Technical events organized by other colleges				
Academic Year	**Name of technical event**	**Event activity**	**Name of the student**	**Rank**
				2017
2017	Anokha Technical fest	Anokha	Abhijeeth	Participated in Workshop organized by IGCAR, Anokha 2017
2017	Anokha Technical fest	Anokha	Aarthy G	Participated in Workshop organized by IGCAR, Anokha 2017
2018	Anokha Technical fest	Anokha	Vishnu Pratap	Won 1st prize in Paradox in Anokha 2018
2018	Anokha Technical fest	Anokha	Hariharan R K	Won first prize in "Research Conclave" in Anokha 2018, Coimbatore
2018	Anokha Technical fest	Anokha	Kamalesh K	Techathon Winner, Anokha 2018
2018	Anokha Technical fest	Anokha	Prashanth R	Techathon Anokha Winner

Table 4.5.3c

Cultural events					
Academic year	**Name of cultural event**	**Event activity**	**Name of the student**	**Rank**	
2016	D4 Dance	Dance competition	Shiva Hari G	D4 Dance season 3 Participant Channel: Mazhavil Manorama	
2016-2017	Amritotsavam	Debate competition	Ashuthosh Pandey	Partition in debate competition	

Cultural events					
Academic year	**Name of cultural event**	**Event activity**	**Name of the student**	**Rank**	
				during the academic year 2016-2017.	
2017	Amritotsavam	Dance competition	Shiva Hari G	Won second prize in Indias folk dance Amritotsavam	
2017	Amritotsavam		Shiva Hari G	Split screen participant,Amritotsavam,2017	
2017	Gokulashtami	Solo Dance	Prateeka Haldori	Participated in Gokulashtami solo dance competition	
2017	Gokulashtami	Quiz	Ananthapadmanaban	Participant - Gokulashtami Quiz 2018	
2017	South zone competition	Singing	Ashuthosh Pandey	Represent the university on South zone competition during the academic year 2017-2018.	
2017	Amritotsavam	Singing	Ashuthosh Pandey	Secured second position in western solo singing competition in Amritotsavam 2017.	
2017	Amritotsavam	Singing	Ashuthosh Pandey	Secured first position in classical	

Cultural events					
Academic year	**Name of cultural event**	**Event activity**	**Name of the student**	**Rank**	
				group singing competition in Amritotsavam 2017.	
2017	Amritotsavam	Singing	Ashuthosh Pandey	Secured second position in western group singing competition in Amritotsavam 2017.	
2017	AIU	Singing	Ashuthosh Pandey	Secured second position in western group singing in AIU 2017-2018.	
2018	Lucid Productions,Coimbatore	Singing	Ashuthosh Pandey	Participated in solo singing competion by Lucid production in Coimbatore.	
2018	Gokulashtami	Mime	Anirudha	Participated and won 2nd prize in Gokulashtami mime	
		Quiz	Anirudha	Participated in quiz conducted by Shristi club	
2018	Advanced	Dance	Anuraghavi	Doing a degree in	

Cultural events					
Academic year	**Name of cultural event**	**Event activity**	**Name of the student**	**Rank**	
	Diploma in fine arts			Bharaathanatyam (Advanced Diploma in Fine Arts)	
2018	Dance	Choreography	Anuraghavi	Choreography for outside school annual days	
2018		Harmony week celebrations	Anuraghavi	Participated in the communal harmony week celebration conducted by Govt. of India, Amrita ,Coimbatore	
2018	Intercollege	Dance competitions	C Girish	Participated in intercollege dance competitions (Sastra , NIT Calicut, Sacred heart college Kochi)	
2018	World mental health day competitions	Slogan writing	Hariharan R K	Won prize for slogan writing ,World mental health day competitions	
2018	Amritotsavam	ADZAP competition	Kavya Easwar	Secured second prize in ADZAP competition for Amritotsavam 2018	
2018	Amritotsavam	ADZAP competition	A R Nagarajan	Won 1st prize in Adzap event in Amritotsavam,2018	
2018	Amritotsavam	ADZAP competition	Sai Maadesh	Won second prize in Adzap competition, Amrtotsavam	

Cultural events					
Academic year	**Name of cultural event**	**Event activity**	**Name of the student**	**Rank**	
				2018	
2018	Amritotsavam	Quiz	Sai Maadesh	Participated in mythology quiz as a part of Amritotsavam 2018	
2018	Vision club	Treasure hunt	Sai Maadesh	Participated in vision club treasure hunt	
2018	Gokulashtami	Mime	Sreehari A B	Participated and won 2nd prize in Gokulashtami mime	
2018	Shristi Club	Quiz	Vijay S	Participated in Srishti club quiz	
2018	Dept.of Mass Communication	Quiz	Vijay S	Participated in Film quiz conducted by Dept.of Mass Communication	
2018	Gokulashtami	Mime	Vijay S	Won 2nd prize in mime in Gokulashtami 2018	
2018	Gokulashtami	Mime	Vijaya Raghavan	Won second place in Gokulashtami ,Mime 2018	
2018	Amritotsavam	ADZAP competition	Vijaya Raghavan	Won 2 nd place in Adzaap and coordinator of club activities	
2018	Amritotsavam	Dumbshards	Yashwant S	Won second prize in Amritotsavam Dumbsharads	

CRITERION 5: Faculty Information and Contributions (200)

Table B.5

CAY - 2018-19

Sl. No	Name of the Faculty Member CAY - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
1	Sriram Devanathan	PhD	Iowa State University, Ames, Iowa, USA	1997	12	Professor and Chairperson	01/02/2006	01/02/2006	Chemical Engineering and Materials Science	Chemical Engineering and Statistics		4	No	Yes	Regular
2	Subba Rao R	PG D-IIP	Indian Institute of Petroleum, Dehradun	1966	22	Professor	22/04/1997	22/04/1997	Chemical Engineering and Materials Science	Plastic and Engineering			No	Yes	Regular
3	Jayanarayanan K	PhD	Mahatma Gandhi University, Kottayam	2011	20	Professor	01/01/2018	02/07/1999	Chemical Engineering and Materials Science	Polymer Science and Engineering	4	5	No	Yes	Regular
4	Murali Rangarajan	PhD	University of Florida,	2006	12	Professor	01/01/2018	02/01/2008	Chemical Enginee	Chemical Engineering	5	5	No	Yes	Regular

Sl. No	Name of the Faculty Member CAY - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
			Gainesville, USA						ring and Materials Science						
5	Sasangan Ramanathan	PhD	Clarkso University, USA	1995	5	Professor and Dean	01/04/2014	01/04/2014	Chemical Engineering and Materials Science	Chemical Engineering			No	Yes	Regular
5	Nikhil Kothurkar K	PhD	University of Florida, Gainesville FL, USA	2004	12	Associate Professor	01/07/2011	1/10/2007	Chemical Engineering and Materials Science	Nano Technology	1	2	No	Yes	Regular
6	Meera Balachandran	PhD	Amrita Vishwa Vidyapeetham, Coimbatore	2011	19	Associate Professor	01/07/2013	03/08/2000	Chemical Engineering and Materials Science	Polymer Technology	4	4	No	Yes	Regular

Sl. No	Name of the Faculty Member CAY - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
7	Duraisamy Kumaresan	PhD	Indian Institute of Technology Bombay	2004	10	Associate Professor	01/07/2014	01/05/2009	Chemical Engineering and Materials Science	Materials and Photochemistry	4	3	No	Yes	Regular
8	Udaya Bhaskar Reddy Ragula	PhD	Florida Institute of Technology, Melbourne, FL USA	2010	8	Associate Professor	01/07/2015	03/02/2011	Chemical Engineering and Materials Science	Chemical Engineering	7	4	No	Yes	Regular
9	Kannan M	PhD	Mahatma Gandhi University, Kottayam	2012	18	Assistant Professor (Sl.Gr)	-	01/06/2001	Chemical Engineering and Materials Science	Polymer Chemistry			No	Yes	Regular
10	Vinoj Vasu	M.Tech	Cochin University of Science and	2006	17	Assistant Professor (Sl.Gr)		15/05/2002	Chemical Engineering and	Polymer Technology			No	Yes	Regular

Sl. No	Name of the Faculty Member CAY - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
			Technology, Kochi						Materials Science						
11	Sindhu S	M.Tech	Anna University, Chennai	2007	12	Assistant Professor (Sr.Gr)	-	11/07/2007	Chemical Engineering and Materials Science	Biopharmaceutical Technology			No	Yes	Regular
12	Nithya K	PhD	Anna University, Chennai	2007	12	Assistant Professor (Sr.Gr)	-	16/7/2007	Chemical Engineering and Materials Science	Environmental Management	2		No	Yes	Regular
13	Rasana N	M.Tech	Amrita Viswa Vidyapeetham, Coimbatore	2010	12	Assistant Professor (Sr.Gr)	-	18/07/2007	Chemical Engineering and Materials Science	Chemical Engineering	3		Yes	Yes	Regular
14	Krishna Prasad R	PhD	SASTRA University	2009	9	Assistant	-	20/12/2010	Chemical Enginee	Chemical Engineering	2		No	Yes	Regular

Sl. No	Name of the Faculty Member CAY - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
			, Thanjavur			Professor (Sl.Gr)			ring and Materials Science						
15	Thirugnasambandam G M	PhD	Eindhoven University of Technology, The Netherlands	2014	5	Assistant Professor	-	02/06/2014	Chemical Engineering and Materials Science	Materials Science		3	No	Yes	Regular
16	Mahendra Naktuji Nandanwar	PhD	Indian Institute of Science, Bangalore	2016	4	Assistant Professor (Sl.Gr)	-	22/6/2016	Chemical Engineering and Materials Science	Chemical Engineering	1		No	Yes	Regular

CAYm1 - 2017-18

Sl. No	Name of the Faculty Member CAYm1 - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
1	Sriram Devanathan	PhD	Lowa State University, Ames, Iowa, USA	1997	11	Professor and Co-Chairperson	01/02/2006	01/02/2006	Chemical Engineering and Materials Science	Chemical Engineering and Statistics	2	4	No	Yes	Regular
2	Subba Rao R	PG D-IIP	Indian Institute of Petroleum, Dehradun	1966	21	Professor and Chairperson	22/04/1997	22/04/1997	Chemical Engineering and Materials Science	Plastic and Engineering			No	Yes	Regular
3	Jayanarayanan K	PhD	Mahatma Gandhi University, Kottayam	2011	19	Professor	01/01/2018	02/07/1999	Chemical Engineering and Materials Science	Polymer Science and Engineering	8	4	No	Yes	Regular
4	Murali Rangarajan	PhD	University of Florida, Gainesville, USA	2006	11	Professor	01/01/2018	02/01/2008	Chemical Engineering and Material	Chemical Engineering	4	5	No	Yes	Regular

Sl. No	Name of the Faculty Member CAYm1 - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
									s Science						
5	Sasangan Ramanathan	PhD	Clarkson University, USA	1995	4	Professor and Dean	01/04/2014	01/04/2014	Chemical Engineering and Materials Science	Chemical Engineering			No	Yes	Regular
5	Nikhil Kothurkar K	PhD	University of Florida, Gainesville FL, USA	2004	11	Associate Professor	01/07/2011	1/10/2007	Chemical Engineering and Materials Science	Nano Technology	5	2	No	Yes	Regular
6	Meera Balachandran	PhD	Amrita Vishwa Vidyapeetham, Coimbatore	2011	18	Associate Professor	01/07/2013	03/08/2000	Chemical Engineering and Materials Science	Polymer Technology	7	4	No	Yes	Regular
7	Duraisamy Kumaresan	PhD	Indian Institute of	2004	9	Associate	01/07/2014	01/05/2009	Chemical Enginee	Materials and	5	1	No	Yes	Regular

Sl. No	Name of the Faculty Member CAYm1 - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
			Technology Bombay			Professor			ring and Materials Science	Photochemistry					
8	Udaya Bhaskar Reddy Ragula	PhD	Florida Institute of Technology, Melbourne, FL USA	2010	7	Associate Professor	01/07/2015	03/02/2011	Chemical Engineering and Materials Science	Chemical Engineering	2	4	No	Yes	Regular
9	Kannan M	PhD	Mahatma Gandhi University, Kottayam	2012	17	Assistant Professor (Sl.Gr)	-	01/06/2001	Chemical Engineering and Materials Science	Polymer Chemistry	1		No	Yes	Regular
10	Vinoj Vasu	M.Tech	Cochin University of Science and Technology, Kochi	2006	16	Assistant Professor (Sl.Gr)		15/05/2002	Chemical Engineering and Materials Science	Polymer Technology			No	Yes	Regular

Sl. No	Name of the Faculty Member CAYm1 - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
11	Sindhu S	M.Tech	Anna University, Chennai	2007	11	Assistant Professor (Sr.Gr)	-	11/07/2007	Chemical Engineering and Materials Science	Biopharmaceutical Technology	3		No	Yes	Regular
12	Nithya K	M.Tech	Anna University, Chennai	2007	11	Assistant Professor (Sr.Gr)	-	16/7/2007	Chemical Engineering and Materials Science	Environmental Management	2	1	Yes	Yes	Regular
13	Rasana N	M.Tech	Amrita Viswa Vidyapeetham, Coimbatore	2010	11	Assistant Professor (Sr.Gr)	-	18/07/2007	Chemical Engineering and Materials Science	Chemical Engineering			Yes	Yes	Regular
14	Krishna Prasad R	PhD	SASTRA University, Thanjavur	2009	8	Assistant Professor (Sl.Gr)	-	20/12/2010	Chemical Engineering and Materials Science	Chemical Engineering	5	1	No	Yes	Regular

Sl. No	Name of the Faculty Member CAYm1 - 2018-19	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
15	Thirugnasambandam G M	PhD	Eindhoven University of Technology, The Netherlands	2014	4	Assistant Professor	-	02/06/2014	Chemical Engineering and Materials Science	Materials Science	1	3	No	Yes	Regular
16	Mahendra Naktuji Nandanwar	PhD	Indian Institute of Science, Bangalore	2016	3	Assistant Professor (Sl.Gr)	-	22/6/2016	Chemical Engineering and Materials Science	Chemical Engineering			No	Yes	Regular

CAYm2 - 2016-17

Sl. No	Name of the Faculty Member (CAY m2 - 2016-17)	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
1	Sriram Devanathan	PhD	Lowa State University, Ames, Iowa, USA	1997	10	Professor and Co-Chairperson	01/02/2006	01/02/2006	Chemical Engineering and Materials Science	Chemical Engineering and Statistics	2	4	No	Yes	Regular
2	Subba Rao R	PG D-IIP	Indian Institute of Petroleum, Dehradun	1966	20	Professor and Chairperson	22/04/1997	22/04/1997	Chemical Engineering and Materials Science	Plastic and Engineering			No	Yes	Regular
3	Jayanarayanan K	PhD	Mahatma Gandhi University, Kottayam	2011	18	Associate Professor	01/01/2018	02/07/1999	Chemical Engineering and Materials Science	Polymer Science and Engineering	7	4	No	Yes	Regular
4	Murali Rangarajan	PhD	University of Florida, Gainesville, USA	2006	10	Associate Professor	01/01/2018	02/01/2008	Chemical Engineering and Material	Chemical Engineering	7	6	No	Yes	Regular

Sl. No	Name of the Faculty Member (CAY m2 - 2016-17)	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
									s Science						
5	Sasangan Ramanathan	PhD	Clarkson University, USA	1995	3	Professor and Dean	01/04/2014	01/04/2014	Chemical Engineering and Materials Science	Chemical Engineering			No	Yes	Regular
5	Nikhil Kothurkar K	PhD	University of Florida, Gainesville FL, USA	2004	10	Associate Professor	01/07/2011	1/10/2007	Chemical Engineering and Materials Science	Nano Technology		2	No	Yes	Regular
6	Meera Balachandran	PhD	Amrita Vishwa Vidyapeetham, Coimbatore	2011	17	Associate Professor	01/07/2013	03/08/2000	Chemical Engineering and Materials Science	Polymer Technology	9	3	No	Yes	Regular
7	Duraisamy Kumaresan	PhD	Indian Institute of	2004	8	Associate	01/07/2014	01/05/2009	Chemical	Materials and	1	2	No	Yes	Regular

Sl. No	Name of the Faculty Member (CAY m2 - 2016-17)	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
			Technology Bombay			Professor			Engineering and Materials Science	Photochemistry					
8	Udaya Bhaskar Reddy Ragula	PhD	Florida Institute of Technology, Melbourne, FL USA	2010	6	Associate Professor	01/07/2015	03/02/2011	Chemical Engineering and Materials Science	Chemical Engineering	2	4	No	Yes	Regular
9	Kannan M	PhD	Mahatma Gandhi University, Kottayam	2012	16	Assistant Professor (Sl.Gr)	-	01/06/2001	Chemical Engineering and Materials Science	Polymer Chemistry	1		No	Yes	Regular
10	Vinoj Vasu	M.Tech	Cochin University of Science and Technology, Kochi	2006	15	Assistant Professor (Sl.Gr)		15/05/2002	Chemical Engineering and Materials Science	Polymer Technology			No	Yes	Regular

Sl. No	Name of the Faculty Member (CAY m2 - 2016-17)	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
11	Sindhu S	M.Tech	Anna University, Chennai	2007	10	Assistant Professor (Sr.Gr)	-	11/07/2007	Chemical Engineering and Materials Science	Biopharmaceutical Technology	1		No	Yes	Regular
12	Nithya K	M.Tech	Anna University, Chennai	2007	10	Assistant Professor (Sr.Gr)	-	16/7/2007	Chemical Engineering and Materials Science	Environmental Management	2		Yes	Yes	Regular
13	Rasana N	M.Tech	Amrita Viswa Vidyapeetham, Coimbatore	2010	10	Assistant Professor (Sr.Gr)	-	18/07/2007	Chemical Engineering and Materials Science	Chemical Engineering			Yes	Yes	Regular
14	Krishna Prasad R	PhD	SASTRA University, Thanjavur	2009	7	Assistant Professor (Sl.Gr)	-	20/12/2010	Chemical Engineering and Materials Science	Chemical Engineering	5		No	Yes	Regular

Sl. No	Name of the Faculty Member (CAY m2 - 2016-17)	Degree (highest degree)			Association with the Institution	Designation	Date on which Designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No")	Nature of Association (Regular/Contract)
		Degree (highest degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
15	Thirugnasambandam G M	PhD	Eindhoven University of Technology, The Netherlands	2014	3	Assistant Professor	-	02/06/2014	Chemical Engineering and Materials Science	Materials Science	1	3	No	Yes	Regular
16	Mahendra Naktuji Nandanwar	PhD	Indian Institute of Science, Bangalore	2016	2	Assistant Professor (Sl.Gr)	-	22/6/2016	Chemical Engineering and Materials Science	Chemical Engineering			No	Yes	Regular

5.1. Student-Faculty Ratio (SFR) (20)

(Calculated at Department Level)

No. of UG Programs in the Department (n):
No. of PG Programs in the Department (m):
No. of Students in UG 2nd Year= u1
No. of Students in UG 3rd Year= u2
No. of Students in UG 4th Year= u3
No. of Students in PG 1st Year= p1
No. of Students in PG 2nd Year= p2

No. of Students = Sanctioned Intake + (Actual admitted lateral entry students)

(UG and PG programs of the department considered)

S=Number of Students in the Department = UG1+UG2+UG3+PG1+PG2

F = Total Number of Faculty Members in the Department (excluding first year faculty)

Student Faculty Ratio (SFR) = S / F

Table B.5.1

Year	CAY 2018-19	CAYm1 2017-18	CAYm2 2016-17
u1.1 (2nd Year)	69	69	69
u1.2 (3rd Year)	69	69	69
u1.3 (4th Year)	69	69	69
UG1	**207**	**207**	**207**
p1.1 (1st Year)	0	24	24
p1.2 (2nd Year)	24	24	18
PG1	**24**	**48**	**42**
Total No. of Students in the Department (S)	**231**	**255**	**249**
No. of Faculty in the Department (F)	**14**	**16**	**16**
Student Faculty Ratio (SFR)	**16.50**	**15.94**	**15.56**
Average SFR	**16.00**		

*The SFR calculation faculty having BE/B.Tech., ME/MS/M.Tech., and Ph.D., degree holder are counted for this assessment. The full time faculty having B.Sc., M.Sc., and Ph.D., degree holders not counted for this assessment.

Marks to be given proportionally from a maximum of 20 to a minimum of 10 for average SFR between 15:1 to 20:1, and zero for average SFR higher than 20:1. Marks distribution is given as below:

15.00 - 15.5 - 20 marks

15.51 - 16.50 - 18marks

16.51 - 17.50 - 16 marks

17.51 – 18.50 - 14 marks

18.51 – 19.50 - 12 marks

19.51 – 20.00 - 10 marks

Note: Minimum 75% should be Regular/ full time faculty and the remaining shall be Contractual Faculty as per AICTE norms and standards.
The contractual faculty (doing away with the terminology of visiting/adjunct faculty, whatsoever) who have taught for 2 consecutive semesters in the corresponding academic year on full time basis shall be considered for the purpose of calculation in the Student Faculty Ratio.
Provide the information about the regular and contractual faculty as per the format mentioned below:

Table 5.1.1

	Total number of regular faculty in the department	**Total number of contractual faculty in the department**
CAY (2018-19)	14	0
CAYm1 (2017-18)	16	0
CAYm2 (2016-17)	16	0

One of the strengths of the department men

5.2. Faculty Cadre Proportion (20)

The reference Faculty cadre proportion is 1(F1):2(F2):6(F3)

F1: Number of Professors required = 1/9 x Number of Faculty required to comply with 20:1 Student- Faculty ratio based on no. of students (N) as per 5.1

F2: Number of Associate Professors required = 2/9 x Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 5.1

F3: Number of Assistant Professors required = 6/9 x Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 5.1

Table B.5.2

Year	Professors		Associate Professors		Assistant Professors	
	Required F1 (RF1)	Available (AF1)	Required F2 (RF2)	Available (AF2)	Required F3 (RF3)	Available (AF3)
CAY (2018-19)	1.3	4.0	2.6	3.0	7.7	7.0
CAYm1 (2017-18)	1.4	2.0	2.8	5.0	8.5	9.0
CAYm2 (2016-17)	1.4	2.0	2.8	5.0	8.3	9.0
Average Numbers	1.36	2.67	2.72	4.33	8.17	8.33

As per table 5.1, BE/B.Tech., ME/MS/M.Tech., and Ph.D., degree holder are counted for this assessment. The full time faculty having B.Sc., M.Sc., and Ph.D., degree holders not counted for this assessment. So Professor, Associate Professor and Assistant Professor level the available faculty number exceeds than in required level.

$$\text{Cadre Ratio Marks} = \left[\left[\frac{AF1}{RF1} \right] + \left[\frac{AF2 \times 0.6}{RF2} \right] + \left[\frac{AF3 \times 0.4}{RF3} \right] \right] \times 10$$

Cadre Ratio Marks = [(AF1/RF1) + [(AF2/RF2)*0.6] + [(AF3/RF3)*0.4]] X 10

= (1.96 + 0.96 + 0.41) X 10

= (3.33) X 10

= 33.3

- If AF1 = AF2= 0 then zero marks
- Maximum marks to be limited if it exceeds 20

Example: Intake = 60 (i.e. total no. of students= 180); Required number of Faculty: 9; RF1= 1, RF2=2 and RF3=6

Case 1: AF1/RF1= 1; AF2/RF2 = 1; AF3/RF3 = 1; Cadre proportion marks = (1+0.6+0.4) x 10 =

20

Case 2: AF1/RF1= 1; AF2/RF2 = 3/2; AF3/RF3 = 5/6; Cadre proportion marks = (1+0.9+0.3) x 10

= limited to 20

Case 3: AF1/RF1=0; AF2/RF2=1/2; AF3/RF3=8/6; Cadre proportion marks

= (0+0.3+0.53) x 10 = 8.3

5.3. Faculty Qualification (20)

FQ = 2.0 x [(10X +4Y)/F)] where x is no. of regular faculty with Ph.D., Y is no. of regular faculty with M. Tech., F is no. of regular faculty required to comply 20:1 Faculty Student ratio.

Table B.5.3

	X	**Y**	**F**	**FQ = 2.0 x [(10X +4Y)/F)]**
CAY (2018-19)	11	3	11.55	21.1
CAYm1 (2017-18)	10	6	12.75	19.5
CAYm2 (2016-17)	9	7	12.45	19.0

Average Assessment	19.8

5.4. Faculty Retention (10)

Table B.5.4

Item (% of faculty retained during the period of assessment keeping CAYm3 as base year)	Marks
>= 90% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	10
>=75% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	8
>= 60% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	6
>= 50% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	4
< 50% of required Faculty members retained during the period of assessment keeping CAYm3 as base year	0

No. of regular faculty members in CAYm2= 16 CAYm1= 16 CAY= 14

Description	**2018-19**	**2017-18**	**2016-17**
Total No Of Faculty	14	16	16
No of Faculty Retained compared to CAYm3	13	15	15
% of Faculty Retained	100	100	100

Average is 100%

5.5. Faculty competencies in correlation to Program Specific Criteria (10)

Table B.5.5 provides an overview of specializations, research publications, course teaching and development of the various faculty members in the department. It showcases the wide diversity of faculty competencies in the broad area of chemical engineering and allied fields. The various areas of specialization (column headers) are indicated as by a two-letter code. Please refer to the legend for details. In each cell, P(#) indicates the number of publications, while C(#) means number of different courses taught during the assessment period.

Table B. 5.5: Faculty publications and courses taught in different areas of specialization

Faculty Name	CC	PI	CA	EC	MS	PH	GT	MT	ST	ES	EV	BT	ME
Prof. Subba Rao R													C(1)
Prof. Sriram Devanathan					C(1) P(9)		P(1)	P(6)		C(1)	P(1)		C(1)
Dr. Sasangan Ramanathan								P(1)					
Mrs. Rasana N	C(4)							P(9)					
Dr. Thirugnasambandam G M								P(2) C(1)					
Dr. Jayanarayanan K	C(3)							P(16) C(1)					
Dr. Meera Balachandran	C(7)							P(12) C(1)			P(1)		C(1)
Dr. Nikhil Kothurkar K			P(2)	P(4)				P(28) C(2)		P(5)	P(5) C(1)		
Dr. Murali Rangarajan				P(19)	P(12) C(1)			P(32)			P(5)		
Dr. Duraisamy Kumaresan			P(1)					P(12) C(2)					
Dr. Udaya Bhaskar Reddy Ragula		P(4) C(1)	P(3) C(2)		P(3) C(1)					C(1)			
Mrs. Sindhu S	C(1)											C(1)	
Dr. Nithya K							P(2)		C(2)		P(4) C(1)		
Dr. Krishna Prasad R	C (10)				P(4)			P(2)	P(10)		P(10)		

Faculty Name	CC	PI	CA	EC	MS	PH	GT	MT	ST	ES	EV	BT	ME
Dr. Kannan M							C(1)	P(2) C(1)					
Mr. Vinoj Vasu								C(1)	C(1)				
Dr. Mahendra Naktuji Nandanwar	C(4)								P(1)				

Legend

CC: Core Courses

PI: Process Intensification

CA: Catalysis

EC: Electrochemistry and Sensors,

MS: Modelling and Simulation, CFD, (

PH: Pharmaceuticals

GT: Green Chemistry and Technology

MT: Materials, Polymers, Composites, Nanomaterials

ST: Separation Techniques

ES: Energy systems

EV: Environmental Engineering and Management

BT: Biotechnology

MT: Management & Economics

5.6. Innovations by the Faculty in Teaching and Learning (10)

Innovations by the Faculty in teaching and learning shall be summarized as per the following description.

Contributions to teaching and learning are activities that contribute to the improvement of student learning. These activities may include innovations not limited to, use of ICT, instruction delivery, instructional methods, assessment, evaluation and inclusive class rooms that lead to effective, efficient and engaging instruction. Any contributions to teaching and learning should satisfy the following criteria:

The work must be made available on Institute website

The work must be available for peer review and critique

The work must be reproducible and developed further by other scholars

The department/institution may set up appropriate processes for making the contributions available to the public, getting them reviewed and for rewarding. These may typically include statement of clear goals, adequate preparation, use of appropriate methods, significance of results, effective presentation and reflective critique

(a) National Mission Project on Education through ICT, Pedagogy Project

The following courses were developed under National Mission Project on Education through ICT, Pedagogy Project for developing suitable pedagogical methods for various classes intellectual calibers and research in e-learning.

Table B.5.6a List of courses developed under National Mission Project on education through ICT

S. No	Names of developer	Course developed	Cost of funds
1	Dr. Murali Rangarajan and Dr. Udaya Bhaskar Reddy Ragula	Chemical Systems Modeling	5.39 Lakhs
2	Dr. D. Sriram and Dr. R. Krishna Prasad	Chemical Process Technology	5.39 lakhs
3	Dr. Nithya K. and Dr. Amrita Thakur	Sustainability and Green Chemistry	5.39 lakhs

The department faculty members are actively involved in various national mission projects for improving the pedagogical methods time to time such as developing new course materials as mentioned in the Table B.5.6a. Conducting online lectures on the subjects such as statistics, thermodynamics and other technological developments in chemical engineering and materials science field are being shared via A-view software among the various campuses of the university time to time as part of e-learning.

(b) **Project based learning (PBL):**

Students are assigned to a design or research project, typically aimed at developing knowledge across several core subject areas (for e.g., a plant design project that brings together aspects of synthesis chemistry, mass & energy balances, thermodynamics, transport phenomena, chemical technology, reactor design, materials science, management, and economics), and work in teams, under a faculty guide's supervision. The specific structure of the course promotes independent, yet supervised learning, and leadership as well as team work, in solving a problem. The flexibility in learning modes

as well as in assessment, provides a strongly encouraging and motivating environment, while yet ensuring academic rigor.

(c) Projects and Comprehensive Viva voce

The final year undergraduate curriculum includes completion of a one year project with comprehensive viva voce. Hence, the final year students are divided in 2 to 4 member teams for executing the project tasks allotted by their project adviser(s). Also, the students are given chances for pursuing their final year projects in prestigious institutions like IISc, IITs, IICT, national laboratories (NCL Pune) and in the institutions in abroad. As a result many undergraduate project teams have published their project works in prestigious international journals and conference proceedings.

(d) **Laboratory sessions** – (Spreadsheet based calculations for Process Control Lab, ASPEN, & MATLAB)

(i) The teaching of computer aided process simulation lab is usually consists of black box teaching (Students are clueless about what the simulation software is doing for them). As an innovative practice, the students are taught to develop equations for all the equipment models that are present in the software (Aspen HYSYS) based on the conservation principles. The solution procedure along with the algorithms were discussed and analyzed.

(ii) Use Microsoft Excel to teach Vapor-Liquid-Equilibrium (both Ideal and Non-ideal) calculations to find the vapor and liquid composition in a vaporization/condensation problem involving multi-components.

(iii) Use Microsoft excel to teach kinetic rate parameter estimation, reactor optimization and recycle problems. The evaluation of the kinetic parameters especially for heterogeneous reactions requires non-linear regression. This was simplified by linearizing the rate expression and Multiple-linear regression was used to estimate the parameters.

(e) **Model building**:

Models of process instrumentation and equipment are included as part of Chemical Process Instrumentation Lab and Heat Transfer in Chemical Engineering. These models are also integrated in the course delivery. This has an added advantage of motivating the students and making them interactive and providing hands-on experience. Animation videos/ Graphics/ Videos are used for explaining topics.

(f) Assignments:

Some of the courses involve individual assignments and course-projects that enable students to gains hands-on experience with process analysis and industry-relevant software such as MATLAB, ASPEN-HYSYS, Minitab, DesignExpert, and Excel macros.

(g) **E-learning resources**:

The in-house developed A-View Lab is used for the participation of students in QEEE program conducted by IITs, intra-university online seminars etc. A valuable learning resource for students is the in-house Amrita Digital Repository.

(h) Live in Labs

This initiative is to provide opportunities for students to get involved in coming up with technology solutions for societal problems. The students visit villages or rural sites during the vacations (after 4th semester or sixth semester) and if they identify a worthwhile project, they register for a 3-credit Live-in-Lab project, in the fifth or seventh semester. The objectives and projected outcome of the project are reviewed and approved by the Dept. chairperson and a faculty member assigned as the project guide. On completion of the project, the student submits a detailed project report. The report is evaluated and the students appear for a viva-voce test on the project. Students undertaking and registering for a Live-in-Lab project, are exempted from registering for an elective course in the higher semester.

(i) ICT-enabled classes:

Along with blackboard teaching, faculty are using multimedia tools such as PowerPoint presentations and educational videos in the class. Students are encouraged to make use of online courses like NPTEL, QEEE classes and get certified. Students are asked for web-based learning with access to online journals and E books. The in-house developed online learning platform, AUMS, is used for student mentoring and monitoring through online examinations, assignments, course materials etc. Students can also view their attendance status and academic performance.

(j) **Student Seminars and Guest Lectures:**

Student seminars are conducted frequently as part of different courses from the first year itself to improve their communication skills and confidence. Numerous guest lectures are arranged by inviting eminent persons from Industry and Academia (Table B.5.8.4). Students are also motivated to attend the conferences and workshops organized by the department and other institutions. Corporate and Industrial Relations (CIR) has established MoU with various organizations and invite experts to give special lectures and seminars on current topics.

(k) Professional Bodies:

The importance of being a member in the professional bodies is explained to the students and they are encouraged to become members of professional societies like PetroTech/FIPI and IICHE for which we have active student chapters on campus. Students have won prizes in the national-level Annual Conclave of PetroTech/FIPI Student Chapters.

(l) Students Internships and Projects:

Student exchange opportunities are extended to encourage students for doing their project (a semester abroad) by taking an equivalent course credit in various international universities like UPC Barcelona, TU Berlin, TU Paderborn, KTH, NUS, Technion-Israel Institute of Technology, Rice University, University of Auckland. Students also undertake internships at renowned institutes and research organizations within India such as IITs,

IISc, NCL, RDE, Pune and so on. A large number of students also goes for industry-internships. For details, please refer to Criterion B.2.2.5.

(m)Social Media use for student communication:

Faculty members frequently use social media platforms such as WhatsApp and Google for course management and academic communications with students.

5.7. Faculty as participants in Faculty development/training activities/STTPs (15)

- A Faculty scores maximum five points for participation
- Participation in 2 to 5 days Faculty/ Faculty development program: 3 Points
- Participation >5 days Faculty/ Faculty development program: 5 points

Table B.5.7

Faculty as participants in Faculty development/training activities/STTPs (15)	**Max. 5 per Faculty**		
Name of the Faculty	**CAYm1 (2019-18)**	**CAYm2 (2017-18)**	**CAYm3 (2017-16)**
Dr. Sriram Devanathan	-	5	5
Dr. K. Jayanarayanan	-	5	5
Dr. Murali Rangarajan	-	5	5
Dr. Nikhil Kothurkar	-	5	5
Dr. Duraisamy Kumaresan	-	5	5
Dr. Meera B Sasikumar	-	5	5
Dr. Uday Bhaskar Reddy Ragula	-	5	5
Dr. R Krishna Prasad	-	5	5
Dr. M Kannan	-	5	5
Dr. K Nithya	-	5	5
Mr. Vino Vasu	-	5	5
Ms. S Sindhu	-	5	5
Ms. N Rasana	-	5	5
Dr. Thirugnasambadam G M	-	5	5
Dr. Mahendra Naktuji Nandanwar	-	5	5
Sum	-	75	75
RF= Number of Faculty required to comply with 20:1 Student-Faculty ratio as per 5.1	15.3	15.3	15.3
Assessment = 3 × (Sum/0.5 RF) (Marks limited to 15)	0	24.58	24.58
Average assessment over last three years (Marks limited to 15) = 16.38			

Faculty as participants in Faculty development/Training Activities/STTPs Academic Year: 2017-18					
Academic year 2017 – 2018					
S. No	**Name of faculty**	**Title of the Course**	**Duration of the course with Month and date**	**Remarks (AICTE Approved/Sponsoring agency)**	**Name of the institute & Department where the course was conducted**
1	Dr. Sriram Devanathan	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
2	Dr. K. Jayanarayanan	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
3	Dr. Murali Rangarajan	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
4	Dr. Nikhil K. Kothurkar	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
5	Dr. Meera B. Sasikumar	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
6	Dr. M. Kannan	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
7	Mr. Vinoj Vasu	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
8	Dr. Duraisamy Kumaresan	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
9	Dr. Udaya Bhaskar Reddy Ragula	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
10	Dr. R. Krishna Prasad	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
12	Dr. K. Nithya	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
13	Ms. S Sindhu	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
14	Ms. N. Rasana	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
15	Dr. Thirugnasambadam G. M.	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE
16	Dr. Mahendra Naktuji Nandanwar	Photovoltaic Solar Energy Applications	Two days 11-09-2017 to 12-09-2017	No	CEMS - ASE

Faculty as participants in Faculty development/Training Activities/STTPs Academic Year: 2017-18					
Academic year 2017 – 2018					
S. No	**Name of faculty**	**Title of the Course**	**Duration of the course with Month and date**	**Remarks (AICTE Approved/Sponsoring agency)**	**Name of the institute & Department where the course was conducted**
17	Dr. Sriram Devanathan	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
18	Dr. K. Jayanarayanan	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
19	Dr. Murali Rangarajan	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
20	Dr. Nikhil K. Kothurkar	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
21	Dr. Meera B. Sasikumar	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
22	Dr. M. Kannan	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
23	Mr. Vinoj Vasu	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
24	Dr. Duraisamy Kumaresan	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
25	Dr. Udaya Bhaskar Reddy Ragula	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
26	Dr. R. Krishna Prasad	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
27	Dr. K. Nithya	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
28	Ms. S Sindhu	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
29	Ms. N. Rasana	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
30	Dr. Thirugnasambadam G. M.	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE
31	Dr. Mahendra Naktui Nandanwar	ASPEN HYSYS Workshop	Two days 22-02-2018 to 24-02-2018	No	CEMS - ASE

Academic year 2016 – 2017					
S. No	**Name of faculty**	**Title of the Course**	**Duration of the course with Month and date**	**Remarks (AICTE Approved/ Sponsoring agency)**	**Name of the Institute & Department where the Course was conducted**
1	Dr. R. Krishna Prasad	Hands-on Workshop; on Nanomaterials and Nanocomposites	Six days 30-01-2017 to 04-02-2017	No	CEMS - ASE
2	Dr. K. Nithya	Hands-on Workshop; on Nanomaterials and Nanocomposites	Six days 30-01-2017 to 04-02-2017	No	CEMS - ASE
3	Ms. S Sindhu	Hands-on Workshop; on Nanomaterials and Nanocomposites	Six days 30-01-2017 to 04-02-2017	No	CEMS - ASE
4	Ms. N. Rasana	Hands-on Workshop; on Nanomaterials and Nanocomposites	Six days 30-01-2017 to 04-02-2017	No	CEMS - ASE
5	Dr. Thirugnasambadam G. M.	Hands-on Workshop; on Nanomaterials and Nanocomposites	Six days 30-01-2017 to 04-02-2017	No	CEMS - ASE
6	Dr. Mahendra Naktui Nandanwar	Hands-on Workshop; on Nanomaterials and Nanocomposites	Six days 30-01-2017 to 04-02-2017	No	CEMS - ASE
7	Dr. Sriram Devanathan	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
8	Dr. K. Jayanarayanan	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
9	Dr. Murali Rangarajan	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
10	Dr. Nikhil K. Kothurkar	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
11	Dr. Meera B. Sasikumar	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
12	Dr. M. Kannan	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
13	Mr. Vinoj Vasu	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
14	Dr. Duraisamy Kumaresan	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
15	Dr. Udaya Bhaskar Reddy Ragula	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
16	Dr. R. Krishna Prasad	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS

Academic year 2016 – 2017					
S. No	**Name of faculty**	**Title of the Course**	**Duration of the course with Month and date**	**Remarks (AICTE Approved/ Sponsoring agency)**	**Name of the Institute & Department where the Course was conducted**
17	Dr. K. Nithya	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
18	Ms. S Sindhu	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
19	Ms. N. Rasana	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
20	Dr. Thirugnasambadam G. M.	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS
21	Dr. Mahendra Naktui Nandanwar	Radio Chemistry & Nuclear Chemistry Workshop	Two days 02-03-2017 to 03-03-2017	No	IGCAR & IANCAS

5.8. Research and Development (75)

5.8.1. Academic Research (20)

The department has demonstrated significant progress in Academic research over the years. The students are exposed to high quality research environment and are trained to handle state-of-the-art research facilities at our laboratories. They are encouraged to publish their research outcomes in high quality journals. The total number of publications are mentioned in the table below. The department has shown annual increase in number of publications in Scopus indexed journals. In addition to journal publications the faculty members have published book chapters. The department has graduated five PhD students from 2015-2018. There is significant increase in number of students enrolled for doctoral program in our department. As on date, twenty-nine students have been enrolled for their doctoral research.

Table B.5.8.1a Total number of Publications per assessment year

Assessment year	Number of Publications	Citations	Book Published
2018-19	24	172	
2017-18	41	467	5
2016-17	35	336	
2015-16	24	231	

Table 5.8.1 b Research Publications Academic Year: 2018-19

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
1	Jayanarayanan K	Tungsten carbide, boron carbide, and MWCNT reinforced poly(aryl ether ketone) nanocomposites : Morphology and thermomechanical behavior	Journal of Applied Polymer Science	136(5), 47032	2019		1.9
2	Rasana N, Jayanarayanan K	The thermal degradation and dynamic mechanical properties modeling of MWCNT/glass fiber multiscale filler reinforced	Composites Science and Technology	169, pp. 249-259	2019		5.2

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
		polypropylene composites					
3	Rasana N, Jayanarayanan K	Mechanical and Thermal Properties Modeling, Sorption Characteristics of Multiscale (Multiwalled Carbon Nanotubes/Glass Fiber) Filler Reinforced Polypropylene Composites	Journal of Vinyl and Additive Technology	25 (S2), pp. E94-E107	2019		1.13
4	Rasana N, Jayanarayanan K	Non-isothermal crystallization kinetics of polypropylene/short glass fibre/multiwalled carbon nanotube composites	RSC Advances	8(68), pp. 39127-39139	2018		2.94
5	Rasana N, Jayanarayanan K	Effect of Compatibilizer and Carbon Nanotubes on Blends of Polypropylene and Nylon 6	Materials Today Proceedings	5 (11), pp. 25524-25533	2018		
6	Jaynarayanan K	Poly(aryl ether ketone) based individual, binary and ternary nanocomposites for nuclear waste storage: Mechanical,	Materials Research Express	5(10),105306	2018		1.15

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
		rheological and thermal analysis					
7	Jayanarayanan K	Strengthening of Plain Concrete Cylinders with Natural FRP Composite Systems	Iranian Journal of Science and Technology, Transactions of Civil Engineering	published online October 2018	2018		0.52
8	Duraisamy Kumaresan, Nikhil Kothurkar	Thermally Reduced Graphene Oxide as a Counter Electrode Material for Dye-Sensitized Solar Cells	Journal of Nanoscience and Nanotechnology	Volume 19, Number 4,pp. 2166-2173(8)	April 2019		1.35
9	Meera Balachandran	Cure and Degradation Kinetics of Sulfur Cured Nanocomposites of EPDM-NBR Rubber Blends	Materials Today Proceedings	Volume 5, Issue 11, Part 3, 2018, Pages 23586–23595.	2018		
10	Meera Balachandran	Investigation and Optimization of Mechanical, Thermal and Tribological Properties of UHMWPE – Graphite Nanocomposites	Materials Today Proceedings	Volume 5, Issue 11, Part 3, 2018, Pages 25139-25148	2018		
11	Meera Balachandran	Photocatalytic degradation of Metformin and Amoxicillin in synthetic hospital waste	International Journal of Environmental Science and Technology		July 2018		2.037

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
		water- Effect of Classical parameters					
12	Meera Balachandran	Mechanical and Sorption Behaviour of Organo-modified Montmorillonite nanocomposites based on EPDM – NBR Blends	Materials Today Proceedings	Volume 5, Issue 8, Part 3, 2018, Pages 16132-16140.	2018		
13	Meera Balachandran	Dielectric Properties, Thermal Characteristics and Degradation Kinetics of PMMA Nanodielectrics	Materials Today Proceedings	Accepted	2019		
14	Murali Rangarajan	Heavy Metals Removal and Leaching from Pervious Concrete Filter: Influence of Operating Water Head and Graphene Addition	ASCE Journal of Environmental Engineering	Accepted	December 2018		1.541
15	Murali Rangarajan	Critical evaluation of mechanism responsible for biomass abatement during electrochemical coagulation	Journal of Environmental Management	Volume 227, Page 335-353	2018		4.005

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
		(EC) process: A critical review					
16	Murali Rangarajan	Corrosion Protection of Mild Steel by Graphene-based Films	Materials Research Express	Volume 5, Article 08520	2018		1.151
17	K. M. Mini (Civil), Murali Rangarajan	Ultrafine GGBS and Calcium Nitrate as Concrete Admixtures for Improved Mechanical Properties and Corrosion Resistance	Construction and Building Materials	Volume 182, Issue 9, Pages 249-257	2018		3.485
18	Murali Rangarajan	Differential Pulse Voltammetric Detection of Ferulic Acid Using RGO-TiO2 Electrodes	Proceedings of 15th INDICON (IEEE Xplore)	Accepted	2018		
19	Murali Rangarajan	Synthesis of Poly(Ethylene Glycol)-Capped Fe3O4 Nanoclusters by Hydrothermal Method	Proceedings of ICONAMMA 2018 (to be published in IOP Conference Series: Materials Science and Engineering)	Accepted	2018		
20	Murali Rangarajan	Corrosion of Stainless Steels in Acidic, Neutral and Alkaline Saline Media: Electrochemical	Proceedings of ICONAMMA 2018 (to be published in IOP Conference	Accepted	2018		

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
		and Microscopic Analysis	Series: Materials Science and Engineering)				
21	Udaya Bhaskar Reddy Ragula	A Regenerative Adsorption Technique for Removal of Uremic Toxins: An Alternative to Conventional Haemodialysis	Proceedings of ICONAMMA 2018 (Materials Today Proceeding)	Accepted & Published	2018		
22	Udaya Bhaskar Reddy Ragula	Fischer-Tropsch Synthesis over Alumina Supported Cobalt Catalyst in a Fixed-bed Reactor	AIChE Annual Meeting 2018	Accepted & Published	2018		
23	Udaya Bhaskar Reddy Ragula	Dynamic Split Flow Separation of micron-sized Slurry Fischer-Tropsch Catalyst Particles	AIChE Annual Meeting 2018	Accepted & Published	2018		
24	Udaya Bhaskar Reddy Ragula	Effect of Preparation of Pt-Sn Catalyst on Mixed-paraffin Dehydrogenation	International Conference on Advanced Materials for Clean Energy and Health Applications, Jafna, Srilanka	Accepted & Published	2019		
24	Sindhu Subramanian and Udaya Bhaskar	Catalytic and Non-catalytic Pyrolysis of Nerium Oleander	Journal of Thermal Analysis and Calorimetry Conference, Budapest, Hungary	Accepted	June 2019		1.965

S. No		Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.)	Year of Publications	Citations	Impact factor
	Reddy Ragula						
25	Udaya Bhaskar Reddy Ragula	Efficiency Improvement in Solar Cogeneration using Microchannel Heat Exchangers	Journal of Thermal Analysis and Calorimetry Conference, Budapest, Hungary	Accepted	June 2019		1.965
26	R. Krishna Prasad	Spectral characterization and surface morphology of delignification of Kraft pulp with carbamide peroxide	Journal of Environmental Chemical Engineering, 6 (2018) 5906 – 5914. https://doi.org/10.1016/j.jece.2018.09.013	Published	2018		
27	R. Krishna Prasad, D. Kumaresan	Characterization of Poly Methyl Methacrylate and Reduced Graphene Oxide Composite for Application as Electrolyte in Dye Sensitized Solar Cells	Material Research Express, DOI: 10.1088/2053-1591/aabbf2	Published	2018		

Table 5.8.1 c Research Publications Academic Year: 2017-18

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
1	Meera Balachandran	Organo-Modified Layered Silicate Nanocomposites of EPDM–Chlorobutyl Rubber Blends for Enhanced Performance In γ-Radiation And Hydrocarbon Environment	Journal of Composite Materials	DOI: 10.1177/0021998318763504	2018		1.613
2	Meera Balachandran	Polymer Nanocomposite Containing High Permittivity Nanoparticles for Energy Storage Application	International Journal of Nanotechnology and Applications	Volume 11, Number 4 (2017), pp. 305-318	2017		NIL
3	Meera Balachandran	Process Optimization Of Functionalized Mwcnt/Polyetherimide Nanocomposites For Aerospace Application	Materials and Design	127 : 193-203, https://doi.org/10.1016/j.matdes.2017.04.081	2017	14	4.525
4	Meera Balachandran	EPDM – Chlorobutyl Rubber Blends in γ-	Journal of Applied Polymer Science	134 (33) : 45195, September 2017.	2017	3	1.86

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Radiation and Hydrocarbon Environment: Mechanical, Transport and Ageing Behavior		DOI: 10.1002/app.45195.			
5	Meera Balachandran	Hybrid Nanocomposites of EPDM-Chlorobutyl Rubber Blends for Radiation and Hydrocarbon Environments	Rubber and elastomers Symposium, 34th International Conference of the Polymer Processing Society (PPS-34), Taipei, Taiwan, May 21-25, 2018.		2018		
6	Meera Balachandran	Cure and Degradation Kinetics of Sulfur Cured Nanocomposites of EPDM-NBR Rubber Blends	Proceedings of the second edition of IConAMMA a three day International Conference on "Advances in Materials and Manufacturing Applications (IConAMMA 2017)" organized by Amrita Vishwa Vidyapeetham ,Bangalore, India, 17th-19th August 2017.		2017		

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
7	Meera Balachandran	Investigation and Optimization of Mechanical, Thermal and Tribological Properties of UHMWPE – Graphite Nanocomposites	Proceedings of the second edition of IConAMMA a three day International Conference on "Advances in Materials and Manufacturing Applications (IConAMMA2017)" organized by Amrita Vishwa Vidyapeetham ,Bangalore, India, 17th-19th August 2017.		2017		
8	Jayanarayanan K	Microstructure Development, Wear Characteristics and Kinetics of Thermal Decomposition of Hybrid Nanocomposites Based on Poly Aryl Ether Ketone, Boron Carbide and Multi Walled Carbon Nanotubes	Journal of Inorganic and Organometallic Polymers and Materials	27(6), 1649-1663 https://doi.org/10.1007/s10904-017-0626-5	2017	3	1.75
9	Rasana N,	Polypropylene/short glass fiber/nanosilic	Polymer Bulletin	75(6), 2587-2605	2018	5	1.59

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
	Jayanarayanan K	a hybrid composites: evaluation of morphology, mechanical, thermal, and transport properties		https://doi.org/10.1007/s00289-017-2173-1			
10	Jayanarayanan K, Rasana N	Synergistic effect of the inclusion of glass fibers and halloysite nanotubes on the static and dynamic mechanical, thermal and flame retardant properties of polypropylene	Materials Research Express	5(6), Article number 065308 https://doi.org/10.1088/2053-1591/aac67d	2018	3	1.15
11	Rasana N, Jayanarayanan K	Experimental and micromechanical modeling of fracture toughness: MWCNT-reinforced polypropylene/glass fiber hybrid composites	Journal of Thermoplastic Composite Materials	https://doi.org/10.1177/089270571878568 7	2018	1	0.91
12	Rasana N, Jayanarayanan K	Effect of Compatibilizer and Carbon Nanotubes on Blends of	Proceedings of the second edition of IconAMMA a three day International				

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Polypropylene and Nylon 6	Conference on "Advances in Materials and Manufacturing Applications (IConAMMA 2017)" organized by Amrita Vishwa Vidyapeetham ,Bangalore, India, 17th-19th August 2017.				
13	Rasana N, Jayanarayanan K	Influence of multiphase fillers on mechanical, transport and rheological properties of polypropylene	Materials Today Proceedings	5(2018),16478-16486,https://doi.org/10.1016/j.matpr.2018.05.151	2018	2	
14	Nithya.K	Fast kinetics and high adsorption capacity of green extract capped superparamagnetic iron oxide nanoparticles for the adsorption of Ni(II) ions	Journal of Industrial and Engineering Chemistry	59(2018), 230-241, https://doi.org/10.1016/j.jiec.201	2018	4	4.4
15	Nithya K.	Adsorption Studies of Amine-Modified Green Synthesized	Desalination and water treatment	DOI: 10.5004/dwt.2018.22282	2018		1.63

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Iron Nanoparticles for the Removal of Nickel from Aqueous Solution					
16	Nithya K.	Adsorption Studies of Amine-Modified Green Synthesized Iron Nanoparticles for the Removal of Nickel from Aqueous Solution	Proceedings of 3rd International Conference on Recent Advances in Chemical, Environmental and Energy Engineering (RACEE), SSN College of Engineering, Chennai, Feb 15 - 16, 2018		2018		
17	R. Krishna Prasad	Biodiesel synthesis from Cottonseed oil using homogeneous alkali catalyst and using heterogeneous multi walled carbon nanotubes: Characterization and Blending Studies	*Egyptian Journal of Petroleum*	26 125-133. doi.org/10.1016/j.ejpe.2016.04.001	2017	2	

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
18	R. Krishna Prasad, Udaya Bhaskar Reddy Ragula, D. Kumaresan	Kinetics and characterization of transesterification of cottonseed oil to biodiesel using calcined clam shells as catalyst	*Biofuels*	DOI: 10.1080/17597269.2017.1378994	2017		
19	R. Krishna Prasad	Synthesis and Characterization of Rubber Seed Oil Trans-esterified Biodiesel Using Cement Clinker Catalysts	*International Journal of Sustainable Energy*	DOI: 10.1080/14786451.2017.1414052	2017		
20	R. Krishna Prasad	Kinetics and Sub Sieve Morphology of Ball Mill Grinding for different grades of Indian coals	*International Journal of Oil, Gas and Coal Technology*	17 (4) 458 - 471. doi.org/10.1504/IJOGCT.2018.090967	2018		
21	R. Krishna Prasad	Enzymatic and Chemical Delignification of Kraft Wood Pulp: Optimization & Sequential Studies	*Environmental Engineering and Management Journal,*	16(11) (2017) 2497-2504	2017		
22	D. Kumaresan	Reduced graphene oxide	*Applied Surface Science*	428, 439-447. DOI:10.1	2018	6	4.4

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		wrapped hierarchical TiO2 nanorod composites for improved charge collection efficiency and carrier lifetime in dye sensitized solar cells		016/j.apsusc.2017.09.142			
23	D. Kumaresan	Surfactant-assisted synthesis of metallic cadmium, cadmium hydroxide nanostructures and their electrochemical charge storage properties	*Dalton Transactions*	47, 8683-8689. DOI: 10.1039/C8DT00638E	2018		4.09
24	D. Kumaresan	Synthesis of hierarchical barium titanate micro flowers with superior light-harvesting characteristics for dye sensitized solar cells	*Material Research Express*	5, 075503. DOI: 10.1088/2053-1591/aace86	2018		1.15
25	R. Krishna Prasad, D.	Characterization of Poly Methyl Methacrylate	*Material Research Express*	DOI: 10.1088/2053-	2018		1.15

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
	Kumaresan	and Reduced Graphene Oxide Composite for Application as Electrolyte in Dye Sensitized Solar Cells		1591/aabbf2			
26	S. Sindhu, Udaya Bhaskar Reddy Ragula	Pyrolysis Kinetics of *Hibiscus Rosa Sinensis* and *Nerium Oleander*	Biofuels	DOI:10.1080/17597269.2018.1432274	2018		
27	S. Sindhu	Preparation and Characterization of Nitrendipine loaded grafted co-polymer microspheres-a preliminary study	Asian Journal of Pharmaceutical and Clinical Research	DOI: 10.22159/ajpcr.2018.v11i9.23733	2018		
28	Madhav Datta, Murali Rangarajan	Electrodeposition of tin-bismuth alloys: Additives, morphologies and compositions	Journal of The Electrochemical Society	DOI: 10.1149/2.1281714jes	2018	1	3.259
29	Murali Rangarajan, Shiju Sathyadevan (Amritapuri)	Intelligent soil quality monitoring system for judicious irrigation	International Conference on Advances in Computing, Communications and	DOI: 10.1109/ICACCI.2017.8125880	2017		

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
			Informatics, ICACCI 2017				
30	B. Rajathilagam, Murali Rangarajan	Edge detection using G-lets based on matrix factorization by group representations	Pattern Recognition	DOI: 10.1016/j.patcog.2017.01.028	2017	3	3.962
31	Udaya Bhaskar Reddy Ragula	Modeling of Particle Breakage and Dispersion in a Slurry Fischer-Tropsch Reactor	AIChE Annual Meeting 2017	Published	2017		
32	Udaya Bhaskar Reddy Ragula	Fischer-Tropsch Synthesis over Alumina Supported Cobalt Catalyst in a Fixed-bed Reactor	AIChE Annual Meeting 2018	Published	2018		
33	Udaya Bhaskar Reddy Ragula	Dynamic Split Flow Separation of micron-sized Slurry Fischer-Tropsch Catalyst Particles	AIChE Annual Meeting 2018	Published	2018		
34	Udaya Bhaskar	A Regenerative Adsorption	Materials Today Proceedings	Published	2018		

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
	Reddy Ragula	Technique for the Removal of Uremic Toxins: An Alternative to Conventional Haemodialysis					
35	Sriram Devanathan	Association of Family Challenges with Self-esteem and Perceived Social Support among Indian Adolescents	Child and Adolescent Social Work Journal	DOI: 10.1007/s10560-018-0553-5	May 2018		0.58
36	Sriram Devanathan	Mathematical modelling of raw material preheating by energy recycling method in metal casting process	International Journal of Sustainable Manufacturing	Volume 36, Issue 3, 2017	2017		1.72
37	Dr. Nikhil K. Kothurkar	TiO2-Carbon Quantum dots (CQDs) nanohybrid: Enhanced photocatalytic activity	Materials Research Express	Volume 5, Issues 7	2018		1.151
38	Dr. Nikhil K. Kothurkar	C-Polyaniline nanocomposites as supercapacitor materials	Materials Research Express	Volume 5, Issues 4	2018	2	1.151

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
39	Dr. Nikhil K. Kothurkar	Polyaniline/Fe2O4-RGO nanocomposites for microwave absorption	IOP conference series: materials science and engineering	Volume 301, Issues 1	2018	1	
40	Dr. Nikhil K. Kothurkar	Synthesis and characterization of graphene quantum dots/ cobalt ferite nanocomposite	IOP conference series: materials science and engineering	Volume 301, Issues 2	2018		
41	Dr. Nikhil K. Kothurkar, Dr. D. Kumaresan	One-step hydrothermal synthesis of marigold flower-like nanostructured MoS2 as a counter electrode for dye-sensitized solar cells	Journal of Solid State Electrochemistry	Volume 22, issues 11	2018	2	2.5
42	Dr. Mahendra N. Nandanwar	A modelling and simulation study of soluble lead redox flow battery: Effect of presence of free convection on the battery characteristics	Journal of Power Sources	Volume 412	2018		6.945

Table 5.8.1 d Research Publications Academic Year: 2016-17

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
1	Meera Balachandran	Study on Silica Infused Recycled Aggregate Concrete Using Design of Experiments	Journal of Engineering Science and Technology	vol. 12, no. 12, 958-971.	2017	2	
2	Meera Balachandran	Effect of Surface Functionalization on Mechanical Properties and Decomposition Kinetics of High Performance Polyetherimide/MWCNT Nano Composites	Composites Part A - Applied Science and Manufacturing	90: 147-160, http://doi.org/10.1016/j.compositesa.2016.06.025	2016	5	4.514
3	Meera Balachandran	Simulation of electric field distribution in nanodiele	Materials Today: Proceedings	3 (6), 2381-2386, doi:10.1016/j.matpr.2016.04.151	2016	1	

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		ctrics based on XLPE					
4	Meera Balachandran	Influence Of High Permittivity Nanoparticle On Water Tree Growth In XLPE Nanocomposite	IEEE ICCPCT-2017 International Conference on Circuits, Power and Computing Technologies organized by Baselios Mathew II College of Engineering, Sasthancotta, Kollam, Kerala, India district on the 20th & 21 st April 2017.	DOI: 10.1109/ICCPCT.2017.8074389	2017		
5	Meera Balachandran	Experimental Study of	Proceedings of Fourth		2017		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Thermal and Mechanical Properties of UHMWPE – Graphite Nanocomposites	International Conference on Nanostructured Materials and Nanocomposites organized by International and Inter University Centre for Nanoscience and Nanotechnology(IIUCNN), Mahatma Gandhi University, Kottayam, India, SIL46, 10th – 12th February 2017.				
6	Meera Balachandran	Experimental Study of Thermal and Mechanic	Proceedings of Fourth International Conferen		2017		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		al Properties of UHMWPE – Acid modified MWCNT Nanocomposites	ce on Nanostructured Materials and Nanocomposites organized by International and Inter University Centre for Nanoscience and Nanotechnology(IIUCNN), Mahatma Gandhi University, Kottayam, India, SIL46, 10th – 12th February 2017.				
7	Meera Balachandran	Influence of Nanofiller Type on Mechanical and Solvent sorption behavior	Proceedings of Fourth International Conference on Nanostructured		2017		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		of Nitrile Rubber based Nanocomposites	Materials and Nanocomposites organized by International and Inter University Centre for Nanoscience and Nanotechnology(IIUCNN), Mahatma Gandhi University, Kottayam, India, SIL46, 10th – 12th February 2017.				
8	Meera Balachandran	Mechanical and Sorption Behaviour of Organo-modified Montmorillonite nanocomposites based on	Proceedings of International Conference on Advanced Materials SCICON'16 organized		2016		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		EPDM – NBR Blends	by Department of Sciences, Amrita Vishwa Vidyapeetham, Amrita Nagar, Coimbatore, India, pp 153, 19th – 21st December 2016				
9	Meera Balachandran	Durability Study of Surface Functionalized MWCNT/PEI nanocomposite for Deep Space Mission	The 10th Asian-Australasian Conference on Composite Materials (ACCM-10), October 16 - 19, 2016, Bexco in Busan, Korea		2016		
10	Jayanarayanan K	Hybrid nanocomposites based on poly aryl ether	e-Polymers	16(6), 493-503 https://doi.org/10.1515/epol	2016	5	1.11

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		ketone, boron carbide and multi walled carbon nanotubes: evaluation of tensile, dynamic mechanical and thermal degradation properties		y-2016-0162			
11	Jayanarayanan K	Influence of silica based carbon nano tube composites in concrete	Advanced Composites Letters	26(1), 12-17	2017	0	
12	Jayanarayanan K	Novel hybrid composites based on glass and sisal fibre for retrofitting of reinforced concrete structures	Construction and Building Materials	133, 146-153 https://doi.org/10.1016/j.conbuildmat.2016.12.045	2017	9	3.49

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
13	Jayanarayanan K	Influence of multiphase fillers on mechanical, transport and rheological properties of polypropylene	Proceedings of International Conference on Advanced Materials SCICON'16 organized by Department of Sciences, Amrita Vishwa Vidyapeetham, Amrita Nagar, Coimbatore, India, 19th – 21st December 2016		2016		
14	Nithya K	An insight into the Prediction of Biosorption Mechanism, and Isotherm, Kinetic and	Desalination and water treatment	80 (2017), 276-287, 10.5004/dwt.2017.20912	2017	1	1.63

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Thermodynamic Studies for Ni(II) ions Removal from Aqueous Solution using Acid Treated Bio-sorbent: the Lantana camara fruit					
15	Nithya K	Functional group assisted green synthesized superparamagnetic nanoparticles for the rapid removal of hexavalent chromium from aqueous solution	IET Nanobiotechnology	11(7), 852-860, 10.1049/iet-nbt.2016.0259	2017	2	1.46
16	Nithya K	Plant extract	*Proceedings of*		2017		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		capped magnetite nanoparticles for the rapid removal of Ni (II) ions from aqueous solution	*International Conference on Recent Advancements in Chemical, environmental and Energy Engineering (RACEEE 2017), 23–24 February 2017, SSN college of Engineering, Chennai, Tamilnadu, pp.35.*				
17	R. Krishna Prasad	Grinding Kinetics, Modeling and Sub Sieve Morphology of Ball Mill Grinding for Cement Industry	*Particulate Science and Technology*	34 (1) 1 - 8. DOI: 10.1080/02726351.2015.1027838	2016		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Ingredients					
18	R. Krishna Prasad	Carbon Nanotubes Dispersed Polymer Nanocomposites: Mechanical, Electrical, Thermal Properties and Surface Morphology	*Bulletin of Materials Sciences*	39(1) 47 – 55 doi.org/10.1007/s1203	2016	5	
19	R. Krishna Prasad	Film Pore Diffusion Modeling and Contact Time Optimization for Sorption of Distillery Spentwash on Fly ash	*Desalination and Water Treatment*	57(52) 24925-24933 doi.org/10.1080/19443994.2016.1143878	2016	1	
20	R. Krishna Prasad	Simulation of Fly ash Particulates Separation in	*International Journal of Environmental Technolo*	19(3) 288 - 300 doi.org/10.1504/IJETM.2016.082255	2016		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		Cyclone Separator	*gy and Manage ment,*				
21	D. Kumaresan	Fabrication of low-cost carbon paste based counter electrodes for dye-sensitized solar cells	*IEEE-International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT) - 2016*	pp. 3760-3764. DOI:10.1109/ICEEOT.2016.7755414	2016	1	
22	M. Kannan	Flame retardant prpoperties of nanoclay filled thermoplastic polyurethane / polypropylene nanocomposites	Journal of vinyl and additive technology	23, pp. E 72-E 80 ; DOI: 10.1002/vnl.21523	2017	3	1.3
23	S. Sindhu	Physico-chemical Studies of Amoxycillin Loaded Sulfonate	Materials Today Proceedings		2017		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		d Polymer.					
24	Murali Rangarajan	Electron scavenger-assisted photocatalytic degradation of amido black 10B dye with Mn3O4 nanotubes: A response surface methodology study with central composite design	Journal of Photochemistry and Photobiology A: Chemistry	DOI: 10.1016/j.jphotochem.2017.03.025	2017	5	2.891
25	B. Rajathilagam, Murali Rangarajan	Spectral representation of principal components in signals and images using G-lets decomposition of subbands	IEEE Region 10 Annual International Conference, Proceedings/TENCON	DOI: 10.1109/TENCON.2016.7848776	2017		

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
26	Murali Rangarajan	Hydrodynamics of Superparamagnetic Iron Oxide Nanoparticles	Materials Today: Proceedings	DOI: 10.1016/j.matpr.2017.06.413	2017		
27	Murali Rangarajan, Nikhil Kothurkar	A design of experiments investigation of the effects of synthesis conditions on the quality of CVD graphene	Materials Research Express	DOI: 10.1088/2053-1591/3/12/125601	2016	2	1.151
28	Murali Rangarajan	Corrosion inhibition properties of graphene oxide on mild steel in 3.5% NaCl	IOP Conference Series: Materials Science and Engineering	DOI: 10.1088/1757-899X/149/1/012064	2016	1	
29	Murali Rangarajan	Effects of additives on kinetics, morphologies and lead-sensing property	Journal of Physical Chemistry C	DOI: 10.1021/acs.jpcc.6b06924	2016	10	4.484

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		of electrode posited bismuth films					
30	Murali Rangarajan	Investigations of suspension stability of iron oxide nanoparticles using time-resolved UV–visible spectroscopy	Journal of Nanoparticle Research	DOI: 10.1007/s11051-016-3570-3	2016		2.127
31	Udaya Bhaskar Reddy Ragula	Modeling of Fischer-Tropsch Synthesis in Microchannel Rector	AIChE Annual Meeing 2016		2016		
32	Sriram Devanathan	A Design of Experiments Investigation of the Effects of Synthesis Conditions on the Quality	Materials Research Express	Vol. 3, Num. 12	2016		1.151

S. No	Faculty name	Title of the paper	Name of Journal/ Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
		of CVD Graphene					
33	Udaya Bhaskar Reddy Ragula, Sriram Devanathan and Renjith Mohan	Solar based lemon grass essential oil distillation for sustainability and livelihood in tribal community	GHTC 2016 - IEEE Global Humanitarian Technology Conference: Technology for the Benefit of Humanity	Conference Proceedings, Institute of Electrical and Electronics Engineers Inc., p.738-744 ISBN: 9781509024322	2016		
34	Dr. Thirugnasambandam	Synthesis and electrochemical properties of binary MgTi and ternary MgTiX (X= Ni, Si) hydrogen storage alloys	International journal of hydrogen energy	10.1016/j.ijhydene.2017.03.093	2016	1	4.229

Table 5.8.1 e Research Publications Academic Year: 2015-16

S. No	Faculty name	Title of the paper	Name of Journal/Conferences	Volume No. (Issue No.) Pages DOI	Year of publication	Citations	Impact factor
1	Meera Balachandran	Response Surface Methodology: A Tool for Assessing the Role of Compounding Ingredients in Peroxide Vulcanization of Natural Rubber	Rubber Chemistry and Technology	Vol. 89, No. 2, pp. 211-226. http://dx.doi.org/10.5254/rct.15.84864	2016	3	1.747
2	Meera Balachandran	Modeling of Electric Field Distribution and Electric Tree Propagation in Epoxy Nanocomposites using Finite Element Method	Journal of Electrical Engineering	15 (3): article 30	2015		0.508
3	Meera Balachandran	Simulation studies on Electric field propagation in cross-linked Polyethylene Nanosilica	Proceedings of International Conference on Macromolecules: Synthesis, Morpholog		2016		

		Composites	y, Processing, Structure, properties and Applications ICM 2016 organized by International Unit on Macromolecular Science and Engineering (IUMSE), Mahatma Gandhi University, Kottayam, Kerala, India held at School of Chemical Sciences, Mahatma Gandhi University, Kottayam, pp 27, 13th – 15th May 2016.				
4	Meera Balachandran	Simulation of electric field distribution in nanodielectrics based on XLPE	Proceedings of International Conference on Recent Advances in Nano Science and		2015	1	

			Technology 2015 (RAINSAT-2015) organized by Sathyabama University in association with CSIR – Central Leather Research Institute at Sathyabama University, Chennai, pp 54, 8th – 10th July 2015				
5	Jayanarayanan K	Effect of compatibilizer on the morphology development, static and dynamic mechanical properties of polymer-polymer composites from LDPE and PET	International Journal of Plastics Technology	Vol.19(1), pp.84-105 https://doi.org/10.1007/s12588-015-9108-1	2015	4	NIL
6	Jayanarayanan K	Effect of blend ratio on the dynamic mechanical and	Iranian Polymer Journal	Vo. 25(4),pp. 373-384 https://doi.org/10.1007/s137	2016	14	1.27

		thermal degradation behavior of polymer–polymer composites from low density polyethylene and polyethylene terephthalate		26-016-0429-5			
7	Jayanarayanan K	Comparative Study on the Morphology, Electrical Resistivity and Dynamic Mechanical properties of Polymer – Polymer Microfibrillar hybrid Nanocomposites and Blends based on Waste Plastics	International Conference on Nanostructures Polymeric materials and Polymer Nanocomposites (ICNPM 2015), , Mahatma Gandhi University, Kottayam, November 13-15,2015		2015		
8	Jayanarayanan K	Effect of MWCNT on Polymer-Polymer Microfibrillar Composites	World congress on Microscopy: Instrumentation, Techniques and Applicatio		2015		

			ns in Life Sciences and Materials Sciences (WCM 2015) ,Mahatma Gandhi University, Kottayam, October 9-11,2015				
9	Nithya K	Biosorption of hexavalent chromium from aqueous solution using raw and acid-treated biosorbent prepared from Lantana camara fruit	Desalination and water treatment	57(52), 25097-25113. https://doi.org/10.1080/19443994.2016.1145605	2016	1.63	2
10	Nithya K	Batch, Kinetic and Equilibrium Studies of Chromium (VI) From Aqueous Phase Using Activated Carbon Derived From Lantana Camara Fruit	Oriental Journal of Chemistry	Volume 31(4), 2319-2326. http://dx.doi.org/10.13005/ojc/310460	2015		2

11	R. Krishna Prasad and Udaya Bhaskar Reddy Ragula	Process Simulation and Modeling of Fluidized Catalytic Cracker Performance in Crude Refinery	*Petroleum Science and Technology*	33(1) 110-117 doi.org/10.1080/10916466.2014.953684	2015	1	
12	R. Krishna Prasad	Process Modeling and Particle Flow Simulation of Sand Separation in Cyclone Separator	*Particulate Science and Technology*	33(4) 385 - 392 doi.org/10.1080/02726351.2014.978426	2015		
13	R. Krishna Prasad	Impacts of Human Farm Activities on Tropical Deforestation and Climate Change: Interactive Statistical Models	*International Journal of Global Warming*	9(1) 81 - 94 doi.org/10.1504/IJGW.2016.074309	2016	2	
14	R. Krishna Prasad	Kinetics and Mass Transfer Models for Sorption of Titanium Industry Effluent in Activated Carbon	*Desalination and Water Treatment*	57(16) 7254 – 7261 doi.org/10.1080/19443994.2015.1016458	2016	2	
15	D. Kumaresan	Portable infrared carbon	IEEE 2015 International	DOI: 10.1109/IIC.2015.	2015		

		dioxide detector for monitoring vehicular emissions	Conference on Industrial Instrumentation and Control (ICIC)	7150837			
16	D. Kumaresan	CdSe Quantum Dots and N719-Dye Decorated Hierarchical TiO2 Nanorods for the Construction of Efficient Co-Sensitized Solar Cells	ChemPhysChem	16, 2543-2548. DOI:10.1002/cphc.201500440	2015	7	
17	M. Kannan	Dynamic mechanical properties of nanoclay filled TPU / PP blend with compatibilizer	Plastics, rubber and composites	44 (6) PP 245-51; DOI: 10.1179/1743289815Y.0000000019	2015	1	0.9
18	D. Kumaresan, Nikhil Kothurkar, Murali Rangarajan	Electrochemical sensing of dopamine, uric acid and ascorbic acid using tRGO-TiO2 nanocomposites	Journal of Nanoscience and Nanotechnology	DOI: 10.1166/jnn.2015.9876	2015	11	1.483
19	Udaya Bhaskar	Modeling of Drying Stage in a	AIChE Annual		2015		

	Reddy Ragula	Bubbling Fluidized Bed Coal Gasifier	Meeting 2015				
20	Udaya Bhaskar Reddy Ragula and Sriram Devanathan	Solar based Lemon Grass Essential Oil Distillation for Sustainability and Livelihood in Tribal Community	Global Humanitarian Technology Conference (GHTC), 2015, Seattle, USA	Conference Proceedings, Institute of Electrical and Electronics Engineers Inc., p.738-744 ISBN: 9781509024322	2015	2	5.832
21	Dr. Nikhil K Kothurkar, Dr. Murali Rangarajan, Dr. Sriram Devanathan	A design of experiments investigation of the effects of synthesis conditions on the quality of CVD grapheme	Materials Research Express	Volume 3, Issues 12 p. 125601	2016	2	1.151
22	Dr. Nikhil K Kothurkar	EMI shielding and microwave absorption behavior of Au-MWCNT/polyaniline nanocomposites	Polymers for advanced technologies	Volume 27, Issues 9 p. 1246-1257	2016	10	2.137

23	Dr. Nikhil K Kothurkar	Performance of a vertical subsurface flow constructed wetland in treating biomethanation effluent	GHTC 2016 - IEEE Global Humanitarian Technology Conference: Technology for the Benefit of Humanity, Conference Proceedings	7857380, pp. 847-853	2016		
24	Dr. Nikhil K kothurkar	GSH-responsive biotinylated poly(vinyl alcohol)-grafted GO as a nanocarrier for targeted delivery of camptothecin	RSC Advances	Volume 6, issues 67 p. 62385-62389	2016	8	2.93

Table B.5.8.1f List of PhD students graduated

S. No	**Faculty name**	**Name of doctoral candidate**	**Year of award**	**Area of research**	**University**
1	Meera Balachandran (Co-guide)	Mohan Kumar P	2018	Development of Ultra High Temperature Resistance Polymeric Nanocomposites for Long Distance Space Applications	Amrita Vishwa Vidyapeetham
2	Duraisamy Kumaresan	Mohan Raj Subramaniam	2017	Synthesis and characterization of TiO2 nanostructured materials and their composites for dye sensitized solar cell applications	Amrita Vishwa Vidyapeetham

3	Murali Rangarajan	A. R. Rajamani	2017	Electrodeposition as a Synthesis Strategy for Controlled Morphologies and Compositions	Amrita Vishwa Vidyapeetham

Table B.5.8.1g List of PhD students enrolled

S. No	Faculty Name	Name of doctoral candidate	Area of research	University	Register Number
1	Meera Balachandran	Harish S Sekhar	Polymer Filler Interaction in Rubbers	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE12002
2	Meera Balachandran	Neelesh Ashok	Nanocomposites based on EPDM Blends for corrosive and radiation environment	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE17002-FT
3	Meera Balachandran	Sarath Kumar P	High Performance Polyether Ketone-Carbon Fibre multiscale composites for Future Generation Space Applications	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE16002
4	Meera Balachandran (Co-guide)	Jennifer Vinodhini	Fabrication of High Performance Thermoplastic Composite for Aviation and Space Application	Amrita Vishwa Vidyapeetham	CB.EN.D*AEE16002-FT
5	Duraisamy Kumaresan	Gireesh Baiju	Flexible polymer based dye sensitized solar cells fabrication through high temperature	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE15007

S. No	Faculty Name	Name of doctoral candidate	Area of research	University	Register Number
			sintering processes		
6	Duraisamy Kumaresan	Murali Balu	Synthesis, characterization of organic and inorganic hybrid nanostructures for the fabrication of high efficiency dye sensitized solar cells	Amrita Vishwa Vidyapeetham	CB. SC.D*CHE16007
7	Duraisamy Kumaresan (co-guide)	Senthil Kumar		Amrita Vishwa Vidyapeetham	
8	Jayanarayanan K	Manu Remanan	Development of Polyetherketone based hybrid nanocomposites for nuclear waste storage	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE15001
9	Jayanarayanan K	Rasana N	Polypropylene based multiscale composites	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE14002
10	Jayanarayanan K (Co-Guide)	Sarath Kumar P	Fabrication of High Performance Thermoplastic Composite for Aviation and Space Application	Amrita Vishwa Vidyapeetham	CB.EN.D*AEE16002-FT
11	Jayanarayanan K (Co-Guide)	Gireesh Baiju	Flexible polymer based dye sensitized solar cells fabrication	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE15007

S. No	Faculty Name	Name of doctoral candidate	Area of research	University	Register Number
			through high temperature sintering processes		
12	Jayanarayanan K (Co-Guide)	Priwiya Peter	PEEK based nanocomposites for aerospace applications	Amrita Vishwa Vidyapeetham	CB.EN.D*AEE13001
13	R. Krishna Prasad (Co-Guide)	Murali Balu	Synthesis, characterization of organic and inorganic hybrid nanostructures for the fabrication of high efficiency dye sensitized solar cells	Amrita Vishwa Vidyapeetham	CB. SC.D*CHE16007
14	Nithya K (Co-guide)	Gopika G.	Bionanocomposites for plating	Amrita Vishwa Vidyapeetham	CB.SC.D*CHE18002
15	Murali Rangarajan (Guide), Nikhil Kothurkar (Co-Guide)	Vinoj Vasu	Molecular Simulations of Graphene Oxide and Interactions with Bisphenol A	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE10001
16	Murali Rangarajan (Guide), Udaya Bhaskar Reddy Ragula (Co-Guide)	Vijitha S. Nair	Doped Perovskite Titanates: Hydrothermal Synthesis, Structure and Electrical Properties	Amrita Vishwa Vidyapeetham	
17	Murali Rangarajan	S. Prem Anandh	Graphene-based Nanostructured Coatings for Corrosion	Amrita Vishwa Vidyapeetham	

S. No	Faculty Name	Name of doctoral candidate	Area of research	University	Register Number
			Protection of Mild Steel		
18	Murali Rangarajan (Guide), Sudip Kumar Batabyal (Co-Guide)	G. Mohan Kumar	Electrochemical Synthesis of Bismuth-Based Thin Films	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE12003
19	Murali Rangarajan	C. R. Krishnan	Porous Concrete Filters for Removal of Heavy Metals from Water	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE15008
20	Udaya Bhaskar Reddy Ragula (Advisor), Murali Rangarajan (Co-Advisor)	Suresh A.K.	Mixed-Paraffin Dehydrogenation Over Bimetallic Pt-Sn/Al2O3 Catalyst	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE14001
21	Udaya Bhaskar Reddy Ragula (Advisor), Murali Rangarajan (Co-Advisor)	Sindhu S.	Kinetics of Pyrolysis and Gasification of Ligno-Cellulosic Biomass	Amrita Vishwa Vidyapeetham	CB.EN.D*CHE14003
22	Udaya Bhaskar Reddy Ragula	Ravinder Bandari	Design of Effective SCR Systems for Reduction of NOX Emissions from Automobiles	Amrita Vishwa Vidyapeetham	CB.EN.D*MEE16007
23	Sriram Devanathan	R. Jeyanthi	Measurement Bias Detection for Serially Correlated Process Data	Amrita Vishwa Vidyapeetham	BL.EN.D*ECE14001
24	Sriram Devanathan	V. Parvathy	Characterization of alcohol use among tribal adolescents of	Amrita Vishwa Vidyapeetham	AM.AR.D*HUM15178

S. No	Faculty Name	Name of doctoral candidate	Area of research	University	Register Number
			Wayanad – a resilience perspective		
25	Sriram Devanathan	Srividya Sheshadri	Social frameworks aiding in design of vocational training as enablers of women empowerment	Amrita Vishwa Vidyapeetham	AM.AR.D* HUM11081
26	Sriram Devanathan	Kripasagar Coley	Social spaces and their role in women empowerment	Amrita Vishwa Vidyapeetham	AM.AR.D* HUM11083
27	Dr. Thirugnasambandam	Srinivas T.	Hematite based Photoanodes for Photoelectrochemical water splitting	Amrita Vishwa Vidyapeetham	CB.SC.D*CHE15102
28	Dr. Thirugnasambandam	Srilakshmi J.	Mg based fluorite structured alloy hydrides for hydrogen storage applications	Amrita Vishwa Vidyapeetham	CB.SC.D*CHE15101
29	Dr. Thirugnasambandam	Elamathy B.	Metal dichalcogenides based Photocathodes for hydrogen production	Amrita Vishwa Vidyapeetham	

5.8.2. Sponsored Research (20)

The department has secured research grants from various government such as BRNS, DST, ISRO, UGC-DAE, and SERB. In addition to government agencies the department has also

secured funding from private companies. The quantum of funding that department has secured for the past four years is around 780 lakhs.

Table B.5.8.2 List of sponsored projects

S.No	Faculty name	Title of project	Name of funding agency	Amount sanctioned (Rs Lacs)	Duration
1	Dr. K. Jayanarayanan	Development of Metal/ Poly ether ketone Hybrid Composite Laminates for Nuclear Waste Storage Containers	BOARD OF RESEARCH IN NUCLEAR SCIENCE (BRNS) [35/14/49/2014-BRNS/10011]	30.97	April 2015- March 2018 (3 years)
2	Dr. Mahendra N. Nandanwar	Natural Convection Driven Flow-Through Soluble Lead Redox Flow Battery With Inbuilt Sonication mechanism for Achieving Longer Cycle Life	SERB-DST	14.34	March 2017 - March 2020
3	Dr. Meera Balachandran	Ethylene Propylene Diene Monomer (EPDM) Rubber based nanocomposites for application in corrosive and radiation environments	UGC-DAE CSR	7.93	June 2014 May 2017
4	Dr. Udaya Bhaskar Reddy Ragula	Developemnt of a 10 kW Cogeneration Unit based on Microcahnnel Heat Exchangers for Efficient Utilization of Solar Energy	DST - CERI	104.97	July 2016 to June 2019
5	Dr. Udaya Bhaskar Reddy Ragula	Kinetics of Mixed-Paraffin Dehydrogenation on Pt-Sn/Al2O3 Catalyst	SERB - YSS	26.82	October 2015 to October 2018

S.No	Faculty name	Title of project	Name of funding agency	Amount sanctioned (Rs Lacs)	Duration
6	Dr. Duraisamy Kumaresan	Roll to roll, high efficient PET based dye sensitized solar cells fabrication through high temperature sintering processes	DST - CERI	67.62	July 2016 to June 2019
7	CEMS Dept	FIST Grant (FEG Scanning Electron Microscope)	DST	248.5	Feb 2018 to Dec 2023
8	Dr. Murali Rangarajan	Iron Oxide Nanostructures from Anodic Dissolution for Electro-Fenton-mediated Oxidative Degradation of Organochlorine Pesticides (OCPs)	SERB National Post Doctoral Fellowship	19.2	Aug 2016 to Jun 2018
9	Dr. Murali Rangarajan	Development of a Pulsed Flow Packed Bed Electrochemical Reactor for Heavy Metals Removal from Groundwater and Wastewater	SERB Extra Mural Research	37.24	Mar 2018 to Mar 2021
10	Dr. G. M. Thirugnasambandam	Photo-electrochemical Splitting of Water with N-doped Graphene-Hematite Composites for Hydrogen Production (PhotoNGrapHy)	DST (Indo-Norway ENERGIX Scheme)	25.88	June 2015 to June 2018
11	Dr. G. M. Thirugnasambandam	Fluorite-structured Metal Hydrides: A New Class of High-capacity MgScX Ternary Alloys for Next Generation NiMH Batteries and Stationary Hydrogen Storage Applications	Australian Mines Company Ltd.	167.736	Dec 2017 to Nov 2021

S.No	Faculty name	Title of project	Name of funding agency	Amount sanctioned (Rs Lacs)	Duration
12	Dr. G. M. Thirugnasambandam	Fluorite-structured Hydrogen Storage Materials: A new class of high capacity Mg-based alloys	DST _INSPIRE Faculty award	35	Sept 2015 to Sept 2020
			Total	**786.206**	

5.8.3. Development activities (15)

Provide details:

- Product Development

The department has shown progress in different research areas especially in energy, water and nuclear technologies. The outcome of the research has been published either in high quality journals or patented.

5.8.3a List of products developed in the department

S.No	Faculty name	Name of the product	Year	Details of the product
1	Udaya Bhaskar Reddy Ragula	Integrated Microchannel Reactor for Fischer-Tropsch Synthesis and Cogeneration	2015	An innovative microchannel reactor was designed to carryout exothermic heat of reactions such as Fischer-Tropsch Synthesis for liquid fuel production from biomass derived syngas. The heat transfer coefficient was found to be 5000 W/m2 K with 15% less pressure drop when compared to the conventional Fischer-Tropsch Reactor. Silimar heat transfer system was tested for cogenration applications using solar energy to overcome the heat transfer irreversibilities.

S.No	Faculty name	Name of the product	Year	Details of the product
2	Udaya Bhaskar Reddy Ragula	Solar based Lemongrass Distillation Unit for Livelihood in Tribal Community	2016	A hybrid solar lemon grass distillation was designed, developed and deployed in a tribal community in Wayanad District, Kerala to improve their Livelihood. This unit is operated in the hybrid mode only during the monsoon season, else it is operated using solar energy alone. Nearly Rs. 12 Lakhs per Annum income was generated from a naturally grown lemongrass in Valaramkunnu village, Wayanad, Kerala.
3	Udaya Bhaskar Reddy Ragula	A Microchannel-based Active Cooling Device for High Performance Electronics	2019	The microchannel heat exchangers offers very high heat transfer rates due to high heat transfer coefficients and high surface to volume ratio. This microchannel heat exchanger was added with a peltier cooler to increase the driving force which was fitted on to an electronic device. It was found that, the electronic device temperature was never went above 32 C. This heat transfer system offers a heat flux of 1.44 E5 W/m2. Which is 1000 times better than the existing electronic cooling devices.

∉ Research laboratories

5.8.3b Research facilities at the department

S.No	Major equipments, Model, Specifications	Cost of equipment (Rs lacs)
Name of laboratory		
Polymer Processing/ Nanocomposites Lab	TWIN SCREW EXTRUDER Make: Aaasabi Machinery. Ltd., Counter Rotating Conical type (18/36) screws L/D Ratio: 36	Rs. 11.00 Lakhs
	Ancillary units fro twin screw extruder	Rs. 8.499 Lakhs
	PLASMA TREATMENT UNIT Treatment width: 10mm-200mm Dyne Level: 44 dynes/cm Output Power and Voltage : 500W, 20kV Line speed: 30 items/min (100mm width	Rs. 2.93 Lakhs
	OSCILLATING DISC RHEOMETER (ODR) Sample Volume : approx. 8 cm3 Oscillating Disk Frequency : 100 cycles / min (1.66 Hz) Oscillating amplitude : ±1°, 3°, 5° (half cycle)	Rs. 2.42 Lakhs
	KNEADING MACHINE Useful Tank Capacity : 40Gms External Power required : Three phase 440Voltss	Rs. 3.65 Lakhs
Central Facility Laboratory	Thermal Analysis Facility [Differential Scanning Calorimeter - DSC, Thermogravimetry - Differential Thermal Analyzer -TG-DTA]	38.07 lakhs (60, 655 US$)
	Fourier Transform Infrared Spectrometer	12 lakhs
	XRD facility with Accessories (Powder, thin film, SAXS)	94 lakhs

S.No	Major equipments, Model, Specifications	Cost of equipment (Rs lacs)
	Electronic Balance, CAP:220gm, Resolution: 0.1mg, Model:ATX-224	0.80 lakhs
	Shimadzu gas chromatograph mass spectrometer, model: Qp 2010 Ultra EI/PCI with accessories	37. 37 lakhs (60,000 US$)
	Field Emission scanning electron microscope (Carl Zeiss, Gemini SEM300)	240 lakhs
Energy Materials & Devices Laboratory	Ball Mill	5. 00 lakhs
	Auto Lab [Electrochemistry Work Station]	22. 00 lakhs
	10500, Class A (Make: Abet Technologies Inc., Low-cost Solar Simulator)	3.6 lakhs
	Probe Sonicator with accessories	1.5 lakhs
	Magnetic stirrer with ceramic hot plate	0.90 lakhs
	Arc melting furnace	11 lakhs
	Centrifuge	0.7 lakhs
	bath sonicator	0.25 lakhs
	Glove box	35 lakhs
	Electrochemical Cells [5 Nos]	5. 00 lakhs
Advanced Functional Materials Laboratory	Pulse Power Supply	2.27 lakhs
	Baincut Diamond Saw and Bainpol Polisher	3.51 lakhs
	Ultrapure Water Facility	4.4 lakhs
	Metallurgical Microscope	2.78 lakhs
	pH Meter	0.28 lakhs
	Muffle Furnace	0.30 lakhs
	Centrifuge	0.19 lakhs

S.No	Major equipments, Model, Specifications	Cost of equipment (Rs lacs)
	All glass double distillation unit 3362-4.0L, DAPS-1.5L (Power supply) BOROSIL	0.7 lakhs
	Rotating Disk Electrode Setup with Potentiostat/ Galvanostat (WaveNow®)	7.4 lakhs
	Electrochemical Workstation with Impedance Analyzer (CHI604E)	6.0 lakhs
	Vacuum Furnace	0.35 lakhs
Nanomaterials Laboratory	Hot Air Oven	0.18 lakhs
	Digital Electronic Balance 0.1mg Accuracy	0.67 lakhs
	Syringe Pump	0.36 lakhs
	Nanovoltmeter with DC Power Supply	4.00 lakhs
	Micro Milli Ohm Meter	0.18 lakhs
	CENTRIFUGE Make: "REMI" MODEL-R8C With 8X15 ml Rotor heads	0.19 lkhs
	All glass double distillation unit 3362-4.0L, DAPS-1.5L (Power supply) BOROSIL	0.7 lakhs
	FD12 - Two stage oil sealed, rotary vane vacuum pump with single phase motor, 220V±10%, 50 Hz	0.46 lakhs
	Catalytic Chemical Vapor Deposition Equipment	16 lakhs
	Magentic stirrer with hot plate	0.60 lakhs
Solar Energy & Optoelectronics Laboratory	Muffle furnace	0.80 lakhs
	Servo hot air oven	0.20 lakhs

S.No	Major equipments, Model, Specifications	Cost of equipment (Rs lacs)
	Teflon lined acid digestion bomb with accessories	1.20lakhs
	Rotary evaporator with accessories	1.73 lakhs
	FD12 - Two stage oil sealed, rotary vane vacuum pump with single phase motor, 220V±10%, 50 Hz	0.46 lakhs
	Spin Coater	2.60 lakhs
	Ultrasonicator	0. 13 lakhs
	Magnetic Stirrer with ceramic hot plate	0.30 lakhs
	Solar Cell Current Voltage Test Station	5.0 lakhs
	UV with DRS	11.0 lakhs
	UV Chamber	0.07 lakhs
Energy Systems & Process Intensification Laboratory	Flow Imaging System	0.55 lakhs
	Regenerative Hemodialyzer	0.44 lakhs
	Three phase fluidization setup	0.15 lakhs
	GHC 3-Zone Tube Furnace w/ accessories	11. 48 lakhs
	Magnetic stirrer with hot plate	1.20 lakhs

- Instructional materials

Table B.5.6 List of instructional materials developed at the department

S.No	Faculty name	Instructional materials developed
1	Murali Rangarajan and Udaya Bhaskar Reddy Ragula	Course Material for "Chemical Systems Modeling" as part of National Pedagogy Project

2	Murali Rangarajan	Course Material for "Materials Science II" (Electronic Materials Science)
3	Dr. D. Sriram and Dr. R. Krishna Prasad	Course Material for "Chemical Process Technology" as a part of National Pedagogy Project
4	Dr .Nithya. K	Course Material for "Sustainability and Green Chemistry" as a part of National Pedagogy Project

5.8.4. Consultancy (from Industry) (20)

Table B.5.8.4 List of consultancy projects

S.No	Faculty name	Title of project	Funding agency	Amount (Rs lacs)	Duration
1	Dr. K. Jayanarayanan/ Dr. M. Kannan	Polymer Identification and Properties Testing	Different Industries like ATS ELGI, Moldwell, Dynamic Techno, Shatel Engineering	2.17	Information given for the period April 2015 to March 2018
2	Dr. Meera Balachandran, Dr. Sriram Devanathan, Dr. K. Jayanarayanan, Dr. M. Kannan	Reduction of Coefficient of friction (COF) when PVC insulated wires are pulled out through PVC Conduit	V-Guard Industries Ltd.	6.53	May 2017 – June 2018
3	Dr. G. M. Thirugnasambandam, Dr. Udaya Bhaskar Reddy Ragula, Dr. Murali Rangarajan	Fluorite-structured Metal Hydrides: A New Class of High-capacity MgScX Ternary Alloys for Next Generation NiMH Batteries and Stationary Hydrogen Storage Applications	Australian Mines Company Ltd.	167.736	Dec 2017 to Nov 2021

5.9. Faculty Performance Appraisal and Development System (FPADS) (10)

The university follows a procedure to monitor faculty member's progress in each academic year. The performance evaluation is carried out on five different activities, such as teaching, research, awards and recognition, department administration and university administration. The faculty members are obligated to prepare self-analysis report based on the recommendations in each category. Self-assessment reports give the faculty members the opportunity to describe to supervisors their achievements and road blocks. The self-analysis report of the individual faculty members is evaluated at the department and school level. Financial incentives can be provided to the faculty members based on the performance. The assessment keeps management up to date on employees' activities, and can help identify an employee's need for support or additional training to progress in research and teaching.

5.10. Visiting/Adjunct/Emeritus Faculty etc. (10)

The department has provision to employ adjunct and visiting faculty members. The department of chemical Engineering and materials science has employed Prof. Madhav datta and Prof. Notten as Adjunct faculty.

Prof. Notten: Peter H.L. Notten was born in The Netherlands in 1952, was educated in analytical chemistry and joined *Philips Research* in 1975. While working at these laboratories on the electrochemistry of etching of III-V semiconductors he received his PhD from the *Eindhoven University of Technology* in 1989. Since then his activities have been focusing on the research of hydride-forming (electrode) materials for application in rechargeable NiMH batteries, switchable optical mirrors and gas phase storage, and Lithium-based rechargeable battery systems. Since 2000 he worked as (part-time) professor at the *Eindhoven University of Technology* (TU/e) in the faculty *Chemical Engineering and Chemistry* where he is heading the group *Energy Materials and Devices*. His main interest includes the development of (*i*) advanced battery and hydrogen storage materials, (*ii*) new battery technologies, (*iii*) modelling of energy storage materials and complete rechargeable battery (NiMH and Li-ion) systems and (*iv*) the development of sophisticated Battery Management Systems (BMS). Since 2010 he was appointed full-professor at TU/e. He is member of the Editorial Board of *Advanced Energy Materials* and *International Journal of Electrochemical Science*. He has published as (co)author about 200 scientific papers and contributions to scientific books and owns about 30 patents. He retired from TU/e in 2017 and presently serves as a group head leader at Fundamental electrochemistry division, Forschungzentrum Jülich, Germany.
He has been appointed as Adjunct faculty at Chemical Engineering and Materials science department, Amrita Vishwa Vidyapeetham Coimbatore in 2014. He visited the department and stayed at the campus from 31st January to 11th Feburary 2015. He had several meetings with our faculty members to discuss their research progress. He also contributed to workshop on "Advanced Functional and Nano Materials" . He also actively participates in PhD students research on Hydrogen storage.

CRITERION 6: Facilities and Technical Support (80)

6.1 Adequate and well equipped laboratories, and technical manpower (40)

The details of the laboratories and the technical staff are given below

Table B.6.1 Details of the laboratories and technical manpower

Sr. No.	Name of the Laboratory	Students per setup (Batch Size)	Important equipment	Weekly utilization (Across all courses)	Technical Manpower support		
					Technical Staff	Designation	Qualification
1	15 CHE 286 Chemical Technology lab	4 (8)	a. Redwood viscometer, b.Pensky Martein flash point apparatus, c. Magnteic stirrer, d.Water bath, e. Volumetric titration arrangement, f. Glassware, g.Oven	2 days	Mr. A.Baladhanpani	Instructor	M.Sc. (Chemistry)
2	15 CHE 282 Mechanical operation lab	4(8)	a. Sieve analysis apparatus, b. Jaw crusher c. Roll crusher, d.Ball mill, e. Cyclone separator f. Drop weight crusher, g. Leaf filter, h. Filter press i.Sedimentation setup apparatus	2 days	Mr. Manikandaprabhu	Lab Technician	M.Sc. (NanoTechnology)
3	15 CHE 385 Chemical Reaction Engineering lab	4(8)	Reactor - Batch reactor; Semi batch reactor; Sono batch reactor; CSTR; Combined reactor inseries; CSTR in series	2 days	Mr. A.Baladhanpani	Instructor	M.Sc. (Chemistry)

Sr. No.	Name of the Laboratory	Students per setup (Batch Size)	Important equipment	Weekly utilization (Across all courses)	Technical Manpower support		
					Technical Staff	Designation	Qualification
4	15 CHE 281 Fluid Mechanics lab	4 (8)	a.Venturimeter b. Orifice meter c. Rotameter d. Pump - centrifugal & reciprocating e. Friction loss in pipe flow f. Drag studies g. annular pipe h. Helical coil, i. Packed bed column	2 days	Mr.C. Ramamoorthy	Senior Lab Assisitant	Diploma in Polymer Technology
5	15 CHE 285 Chemical Engineering Instrumentation Lab	4 (8)	a) Temperature Measurement b) Viscosity Measurement c) Concentration Measurement d) Diameter Measurement e) Density Measurement f) Pressure Measurement g) Flow Measurement	1 day	Mr. Manikandaprabhu	Lab Technician	M.Sc. (NanoTechnology)
6	15 CHE 382 Strength of Materials Lab	4(8)	a.Universal Testing Machine b. Tensile test machine for wires c. Rockwell hardness tester d. Brinell hardness tester e. Impact testing machine for Charpy and Izod test f. Static bending test equipment	2 days	Mr. Srinivasan (Civil Engineering Dept.)	Senior Instructor	B. Tech (Mechanical Engineering)
7	15 CHE 381 Heat transfer lab	4 (8)	a.Heat exchanger, b. Fin pin apparatus, c.Natural convection apparatus, d.Forced convection apparatus, e.Composite wall apparatus, f.Single effect evaporator, g.Jacketed kettle apparatus	2 days	Mr.C. Ramamoorthy	Senior Lab Assisitant	Diploma in PlasticsTechnology

Sr. No.	Name of the Laboratory	Students per setup (Batch Size)	Important equipment	Weekly utilization (Across all courses)	Technical Manpower support		
					Technical Staff	Designation	Qualification
			h.Dropwise film wise condenser				
8	15 CHE 386 Mass transfer lab	4 (8)	a.Simple distillation, b.Steam distillation, c.Packed bed disillation, d.Simple leaching apparatus, e. Surface evaporation apparatus, f. Air vapor equlibrium apparatus, g. Wetted wall column, h. Adsorption isothermal apparatus	2 days	Mr. C. Ramamoorthy	Senior Lab Assisitant	Diploma in PlasticsTechnology
9	15 CHE 481 Chemical process control lab	4(8)	a. First and second order systems. b. Interacting and non-interacting systems c. Control valve characteristics, d. Pressure Control, e. Leve Control, f. Flow Control g. Multiprocess trainer h.Temperature Measurement device Characteristics	3 days	Mr. Dinesh Kumar D	Lab Assisitant	DICE

Sr. No.	Name of the Laboratory	Students per setup (Batch Size)	Important equipment	Weekly utilization (Across all courses)	Technical Manpower support		
					Technical Staff	Designation	Qualification
10	15 CHE 482 Computer aided design lab	Individual	a. Solving Material and Energy Balance Problems using HYSYS b. Thermodynamic Property Estimation c. Simulation and Design of Heat Exchangers and Heat Exchanger Networks d. Simulation of Reactors and Reactive Systems using HYSYS e. Design and Simulation of Distillation, Absorption and Extraction Units	1 day	Not applicable	Not applicable	Not applicable

6.2 Laboratories maintenance and overall ambience (10)

To maintain the proper working condition of all equipments we are rectifying the small problems twice in a month. Every week we are checking the tools and materials. Maintenance check points to be followed are displayed near the respective machines

Monthly Maintenance check points in some of the important equipments are listed below

Single Screw Extruder

1. Band heaters on the barrel, Thermocouple and temperature indication on the control panel
2. Screenpack and breaker plate checking for clogged material
3. Motor drive, gear box , spider coupling checking for any abnormalities
4. Cooling trough water connections checking.
5. Electrical connections in the control panel
6. Die cleaning and heater checking

Twin Screw Extruder

1. Band heaters on the barrel, Thermocouple and temperature indication on the display panel
2. Screenpack and breaker plate checking for clogged material
3. Motor drive, gear box , spider coupling for any abnormalities
4. Cooling trough water connections
5. Electrical connections in the control panel
6. Pelletizer rollers and cutter
7. Die cleaning and heater checking

Injection Moulding Machine

1. Safety door and Limit Switches operation in the clamping unit
2. Clamping unit toggle movement
3. Mould opening and closing. Cleaning of the mould
4. Lubrication of tie rods
5. Hydraulic oil level and top up if required
6. Hydraulic hose lines in the injection unit
7. Barrel heaters, thermocouple and heater connections
8. Hydraulic motor and screw rotation.
9. PLC panel software updation
10. Injection Nozzle cleaning

Two Roll Mill

1. Chain-Pulley drive to the rolls checking
2. Roll Gap Adjustment
3. Lubricant oil, Hydraulic oil and Gearbox oil level checking and top up if required
4. Display board electrical connections
5. Safety guards, emergency stop switches condition

Compression Moulding Machine

1. Top and Bottom platen cartridge heaters
2. Hydraulic oil level and indicator
3. PLC unit functions
4. Safety Sensor
5. Tie rod lubrication
6. Mould daylight checking and adjustment
7. Mould clamps and fasteners
8. Water connections to the mould

Scrap Grinder

1. Motor belt condition
2. Blade Unit (Check for damages on the edges and grind if required)
3. Electrical unit- Starter

4. Fastener movements for door closing and opening

Internal Mixer (Kneader)

1. Mixer blades (for both plastic and rubber) condition
2. Blade attachments to the drive
3. Drive and gear box
4. Temperature Controller operation
5. Heaters on the mixing chamber

Table B 6.2. Overall ambience of the laboratories

Sr. No.	Name of the Laboratory	Safety measures	Ambience
1	Polymer Processing Laboratory	Fire Extinguisher, First Aid Box, Mask, Gloves, Helmet	All the equipments are installed as per the guidelines given by the supplier. Proper electrical, pneumatic and plumbing connections are provided. Diesel generator back up available for continuous operation of machines.
2	Chemical Technology Laboratory	Fire Extinguisher, First Aid Box, Mask, Gloves	Proper electrical, pneumatic and plumbing connections are provided. Diesel generator back up available for continuous operation of machines.
3	Mass Transfer/ Chemical Reaction Engineering Laboratory	Fire Extinguisher, First Aid Box, Mask, Gloves	Proper electrical, pneumatic and plumbing connections are provided. Diesel generator back up available for continuous operation of machines.
4	CoE- AMGT Laboratory	Safety shower, Fire Extinguisher, First Aid Box, Mask, Gloves	Proper electrical, pneumatic and plumbing connections are provided. Diesel generator back up available for continuous operation of machines.

Sr. No.	Name of the Laboratory	Safety measures	Ambience
			Special equipments like DSC, FTIR, XRD are kept in air conditioned cabins

6.3 Safety measures in laboratories (10)

The safety guidelines are displayed in all the laboratories

Safety Precautions and Guidelines (Polymer Processing Lab)

Follow the dress code strictly. Never wear loose clothing while operating the machines. Remove wristwatches, bracelets before starting the work. Wear all safety accessories like shoes, gloves, mask whenever needed.

Never hesitate to ask questions especially if there is any concerning proper operating procedure. Be sure that you understand every instruction before proceeding with the experiment.

· The safety guards on the machines should not be removed without the approval of the lab in charge.

· Know the location and proper use of fire extinguishers, fire blankets, and first aid kits.

· Be sure the mould is clamped properly in injection moulding and compression moulding machines

· Keep the hands away from the moving parts in the machines. Do not touch the barrel of the extruder and injection moulding machine, compression mould with bare hands.

· Never support yourself on the machine. Don't direct compressed air at others or at yourself.

· Restrict yourself to your experiment alone.

· Disconnect the power supply during repairs and maintenance of the machine.

· Report any accident and/or injury, however minor, to your instructor immediately. Your instructor is available for any assistance you may need.

· Before leaving the laboratory, make sure your work area is clean and dry. Ensure that all gas, water, vacuum, and air valves are completely turned off.

Safety Instructions and Guidelines (Chemical Technology Lab)

1. All personal belongings should be placed on the tables placed in the instruction area as you enter the laboratory.

2. Appropriate clothing must be worn at all times while in the laboratory. Your legs must be completely covered below the knee by your choice of clothing. Advised to wear approved laboratory coat or apron which does cover your legs to your knees. Long hair and loose clothing must be confined while in a laboratory.
3. Approved eye protection must be worn at all times in the laboratory. If you do get a chemical in your eye rinse immediately with large quantities of water using the eyewash stations.
4. Know the location and proper use of fire extinguishers, safety showers, eye wash devices, and first aid kits.
5. Never place anything that is not directly required for the experiment on laboratory desks; other items may interfere with the experiment.
6. Before obtaining any chemicals carefully read the label on the reagent bottles. Never direct the open end of test tube toward yourself or anyone else. Use the fume hoods when toxic or irritating vapors are involved. Mouth suction is never used to fill a pipette.
7. Learn the proper procedure for igniting and operating a laboratory burner. Always extinguish the flame when the burner is not being used. Make sure that all flammable reagents are well removed before lighting the burner.
8. Never place chemicals directly on the balance pan. Always use a proper weighing container when using a balance to weigh a chemical. Never pour chemicals directly over the balance.
9. Securely replace lids, caps, and stoppers after removing reagents from containers. Always wipe spatulas clean before and after inserting into reagent bottles. Clean up any spill immediately
10. Before leaving the laboratory, make sure your work area is clean and dry. Ensure that all gas, water, vacuum, and air valves are completely turned off.
11. Report any accident and/or injury, however minor, to your instructor immediately. Your instructor is available for any assistance you may need. Never hesitate to ask questions especially if there is any question concerning proper operating procedure. Be sure that you understand every instruction before proceeding with the experiment.

Table B.6.3 Safety Instructions and devices in the laboratories

Sr. No.	Name of the Laboratory	Safety Instructions	Safety measures/devices
1	Chemical Technology Lab	All personal belongings should be placed on the tables placed in the instruction area as you enter the laboratory. Appropriate clothing must be worn at all times while in the laboratory. Your legs must be completely covered below the knee by your choice of clothing. Advised to wear approved laboratory coat or apron which does cover your legs to your knees. Long hair and loose clothing must be confined while in a laboratory. Approved eye protection must be worn at all times in the laboratory. If you do get a chemical in your eye rinse immediately with large quantities of water using the eyewash stations. Know the location and proper use of fire extinguishers, safety showers, eye wash devices, and first aid kits. Never place anything that is not directly required for the experiment on laboratory desks; other items may interfere with the experiment. Before obtaining any chemicals carefully read the label on the reagent bottles. Never direct the open end of test tube toward yourself or anyone else. Use the fume hoods when toxic or irritating vapors are involved. Mouth suction is never used to fill a pipette. Learn the proper procedure for igniting and operating a laboratory burner. Always extinguish the flame when the burner is not being used. Make sure that all flammable reagents are well removed before lighting the burner. Never place chemicals directly on the balance pan. Always use a proper weighing container when using a balance to weigh a chemical. Never pour chemicals directly over the balance. Securely replace lids, caps, and stoppers after removing reagents from containers. Always wipe spatulas clean before and after inserting into	Safety Charts displayed, Fire Extinguisher, First aid box

Sr. No.	Name of the Laboratory	Safety Instructions	Safety measures/devices
		reagent bottles. Clean up any spill immediately.Before leaving the laboratory, make sure your work area is clean and dry. Ensure that all gas, water, vacuum, and air valves are completely turned off. Report any accident and/or injury, however minor, to your instructor immediately. Your instructor is available for any assistance you may need. Never hesitate to ask questions especially if there is any question concerning proper operating procedure. Be sure that you understand every instruction before proceeding with the experiment.	
2	Polymer Processing Lab	Follow the dress code strictly. Never wear loose clothing while operating the machines. Remove wristwatches, bracelets before starting the work. Wear all safety accessories like shoes, gloves, mask whenever needed. Never hesitate to ask questions especially if there is any concerning proper operating procedure. Be sure that you understand every instruction before proceeding with the experiment. The safety guards on the machines should not be removed without the approval of the lab in charge. Know the location and proper use of fire extinguishers, fire blankets, and first aid kits. Be sure the mould is clamped properly in injection moulding and compression moulding machines. Keep the hands away from the moving parts in the machines. Do	Asbestos gloves, Safety goggles, Fire Extinguisher, First aid box

Sr. No.	Name of the Laboratory	Safety Instructions	Safety measures/devices
		not touch the barrel of the extruder and injection moulding machine, compression mould with bare hands. Never support yourself on the machine. Don't direct compressed air at others or at yourself. Restrict yourself to your experiment alone. Disconnect the power supply during repairs and maintenance of the machine. Report any accident and/or injury, however minor, to your instructor immediately. Your instructor is available for any assistance you may need. Before leaving the laboratory, make sure your work area is clean and dry. Ensure that all gas, water, vacuum, and air valves are completely turned off.	

Sr. No.	Name of the Laboratory	Safety Instructions	Safety measures/devices
3	Mass Transfer/Chemical Reaction Engineering Lab	SAFETY FIRST - USE COMMON SENSE to avoid accidents. Use protective shoes in the lab. Do not lean on equipments. Use heat resistant gloves while handling hot equipment / materials. Do not pull or stamp or insert unauthorized materials on electrical wires and plug points. Keep your work space and instruments clean and tidy. When lab work is completed, all materials must be returned to their proper places and used benches, instruments and glassware must be cleaned up. Leave glassware clean and dry at the close of each laboratory period. Wash and wipe desktop with paper towels. Be sure that electrical connections and water supply are turned off. Each student is responsible for cleaning up spilled chemicals or broken glassware. Read the label twice before taking anything from a container. Do not take the reagent bottles away from their places. Carry liquids to your bench in clean test tubes or beakers and carry solids in clean beakers or on weighing paper. Take the exact amount of reagent indicated. Larger amounts will not be more effective and may lead to uncontrollable reactions. Never return unused chemicals to stock bottles. Dispose properly. Never use one pipette for different chemicals. Do not insert your pipette or dropper into the reagent bottles. Use the one that is designated (labeled) for that reagent. Never throw matches, litmus paper or any solid waste into the sink. If an acid is to be diluted, pour acid slowly into the water with constant stirring. Never add water to acid. Any chemical spilled on your eye should be washed off with plenty of water for at least 15 minutes at the eye wash. Notify an instructor immediately. Any chemicals spilled on the skin should be washed off immediately and	Fire Extinguisher, First- aid box

Sr. No.	Name of the Laboratory	Safety Instructions	Safety measures/devices
		the skin should be flooded with water for several minutes. Notify an instructor immediately. Never taste any laboratory chemicals. Never inhale gaseous fumes or position your nose directly above the sample. In case of fire, notify the instructor immediately. Turn off the heat source. If the fire is uncontrollable, evacuate the room immediately, pull the fire alarm in the hallway, and call the fire department. If clothing catches fire, use a fire blanket or safety shower. If no blanket or safety shower is available, roll the person over the floor while covering with other coats. NEVER spray a fire extinguisher directly on a person. Mercury vapor is invisible, but toxic. A broken thermometer that releases liquid mercury should be reported immediately to the laboratory instructor. Open the windows and leave the room for 15 min.	

6.4 Project laboratory (20)

Apart from the regular academic laboratories advanced equipments are available for the project work of the students . The research laboratories and the facilities available are listed below
The final year students utilize these equipments at an average 12 hours/week.

Table B 6.4. Project Laboratories and facilities

Department of Chemical Engineering & Materials Science - List of Equipments for Project Work of Students		
Lab	Name of Equipment	*Equipment Cost*
Polymers & Nanocomposites Laboratory	Microprocesssor Controlled Fully Automatic Injection Molding Machine (50 T)	11.46 lakhs
	Two Roll Mill	5.82 lakhs
	Single Screw Segmented Barrel Extruder	6.07 lakhs
	Oscillating Disk Rheometer	2.4 lakhs
	Twin Screw Extruder with Accessories	21.98 lakhs
Central Facility Laboratory	Thermal Analysis Facility [Differential Scanning Calorimeter -DSC, Thermogravimetry - Differential Thermal Analyzer -TG-DTA]	38.07 lakhs
	Fourier Transform Infrared Spectrometer	12 lakhs
	XRD facility with Accessories (Powder, thin film, SAXS)	94 lakhs
	ELECTRONIC BALANCE, CAP:220gm, RESOLUTION: 0.1MG, MODEL:ATX-224	0.80 lakhs
	Shimadzu gas chromatograph mass spectrometer, model: Qp 2010 Ultra EI/PCI with accessories	37. 37 lakhs (60,000 US$)

Department of Chemical Engineering & Materials Science - List of Equipments for Project Work of Students		
Energy Materials & Devices Laboratory	Ball Mill	5. 00 lakhs
	Auto Lab [Electrochemistry Work Station]	22. 00 lakhs
	10500, Class A (Make: Abet Technologies Inc., Low-cost Solar Simulator)	3.6 lakhs
	Probe Sonicator with accessories	1.5 lakhs
	Magnetic stirrer with ceramic hot plate	0.90 lakhs
	Electrochemical Cells [5 Nos]	5. 00 lakhs
Advanced Functional Materials Laboratory	Pulse Power Supply	2.27 lakhs
	Bain cut Diamond Saw	3.51 lakhs
	Ultrapure Water Facility	4.4 lakhs
	Metallurgical Microscope	2.78 lakhs
	pH Meter	0.28 lakhs
	Muffle Furnace	0.30 lakhs
	Centrifuge	0.19 lakhs
	All glass double distillation unit 3362-4.0L, DAPS-1.5L	0.7 lakhs

Department of Chemical Engineering & Materials Science - List of Equipments for Project Work of Students		
	(Power supply) BOROSIL	
	Rotating Disk Electrode Setup with Potentiostat/ Galvanostat (WaveNow®)	7.4 lakhs
	Electrochemical Workstation with Impedance Analyzer (CHI604E)	6.0 lakhs
	Vacuum Furnace	0.35 lakhs
Nanomaterials Laboratory	Hot Air Oven	0.18 lakhs
	Digital Electronic Balance 0.1mg Accuracy	0.67 lakhs
	Syringe Pump	0.36 lakhs
	Nanovoltmeter with DC Power Supply	4.00 lakhs
	Micro Milli Ohm Meter	0.18 lakhs
	CENTRIFUGE Make: "REMI" MODEL-R8C With 8X15 ml Rotor heads	0.19 lkhs
	All glass double distillation unit 3362-4.0L, DAPS-1.5L (Power supply) BOROSIL	0.7 lakhs
	FD12 - Two stage oil sealed, rotary vane vacuum pump with single phase motor,	0.46 lakhs

Department of Chemical Engineering & Materials Science - List of Equipments for Project Work of Students		
	220V±10%, 50 Hz	
	Catalytic Chemical Vapor Deposition Equipment	16 lakhs
	Magentic stirrer with hot plate	0.60 lakhs
Solar Energy & Optoelectronics Laboratory	Muffle furnace	0.80 lakhs
	Servo hot air oven	0.20 lakhs
	Teflon lined acid digestion bomb with accessories	1.20lakhs
	Rotary evaporator with accessories	1.73 lakhs
	FD12 - Two stage oil sealed, rotary vane vacuum pump with single phase motor, 220V±10%, 50 Hz	0.46 lakhs
	Spin Coater	2.60 lakhs
	Ultrasonicator	0. 13 lakhs
	Magnetic Stirrer with ceramic hot plate	0.30 lakhs
	Solar Cell Current Voltage Test Station	5.0 lakhs
	UV with DRS	11.0 lakhs
	UV Chamber	0.07 lakhs
Energy Systems &	Flow Imaging System	0.55 lakhs
	Regenerative Hemodialyzer	0.44 lakhs

Department of Chemical Engineering & Materials Science - List of Equipments for Project Work of Students		
Process Intensification Laboratory	Three phase fluidization setup	0.15 lakhs
	GHC 3-Zone Tube Furnace w/ accessories	11. 48 lakhs
	CNC Router with 100 micron pricision	17.43 lakhs
	Magnetic stirrer with hot plate	1.20 lakhs

CRITERION 7: Continuous Improvement (75)

7.1 Actions taken based on the results of evaluation of each of the COs, POs & PSOs (30)

POs & PSOs Attainment Levels and Actions for improvement – CAY only

Table B.7.1 (for the batch 2014-2018)

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems			
PO1	2.00	2.72	1. Students were experiencing difficulty with the topics in fluid kinematics; therefore, more fundamental explanations on velocity, acceleration, stream function and velocity potential function were added; this was done through both homework assignments and tutorials; a greater number of problems were done for application of Bernoulli's equation for flow measurement (CHE211). 2. Students were experiencing difficulty with the mathematics portion of the course, an introduction on vector algebra and differential equations was added, and pedagogy included homework assignments, tutorials and continuous assessment components; Additionally, some videos were used for illustrating simple concepts such as those related to flow patterns and Couette flow. More problems were worked out in class in tutorial sessions (CHE410). 3. Students found difficulties in estimating the reaction rate parameters from plug flow reactor data due to complexity of the mathematics; students were given more problems for practice in this topic; students lack comprehensive understanding of non-elementary steps which result in a particular type of rate expression; therefore number of hours of lecture/explanation was increased for this topic; Additionally, since the content coverage of homogenous, heterogeneous reaction mechanisms and reactor design was perceived to be too vast, the course was split into two courses Chemical Reaction Engineering-I & Chemical Reaction Engineering - II. 4. Content related to filtration and agitation topics were perceived to be too vast, with not enough hours for lecture; As corrective action, instructor gave slides and videos for some of

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
			the descriptive topics, for self-study mode of learning, and subsequently more hours were used for the problem solving of the filtration and agitation topics (CHE221).
Action-1: More number of problems were solved on the application of Bernoulli's equation. Action-2: Videos were used to for illustrating slow patterns. Action-3: Splitting of a single Chemical Reaction Engineering course into two courses. The first course primarily consists of kinetic and reactor design for homogeneous reactions and the second course on kinetics, transfer processes and reactor design for heterogeneous reactions. Action -4: The Materials Science and Strength of Materials was split into two courses in the next curriculum to enable to students spend more time on the complex fundamentals. Action-5: The descriptive topics, which may not require much of the instructor's help were given to the students a priori (Shared through the E-learning module of AUMS) to manage the lecture hours.			
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences			
PO2	2.00	2.70	1. Students had difficulties with membrane separation and combined reaction-separation; action taken is to give more assignment problems on these topics; additionally, more lecture hours were given for the last unit of the course (CHE351); 2. Difficulty with mathematics on the two-dimensional flows especially the boundary layer and the Blasius solution for the same (CHE211). 3. Students had difficulty in solving simultaneous material and energy balances in a reactive system; action taken was development of an excel module for solving such equations (to give a simulation experience) (CHE311). 4. Mathematics required for the understanding chemical bonding, colloids and adsorption needs more practice problems. (CHE240). 5. Course content was perceived to be very large; therefore, in the next curriculum revision, this course has been split into two courses: Materials Technology (3 credits) and Strength of Materials (4 credits); Additionally, industry gave feedback to prepare our students in a stronger way on phase diagrams, hence this portion has been strengthened in the new course of Materials Technology (CHE241).

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
Action-1: As students were unable to relate to principles of measurements, in the context of application of engineering knowledge to industry problems, it was proposed to create a new course on process instrumentation. Action-2: An excel based module for solving simultaneous material and energy balances for non-isothermal reactors was developed to make them see the actual values such as concentration and temperature profiles. Action-3: The concepts of adsorption were analyzed in depth by providing different types of problems that use Langmuir and Freundlich isotherms. Action-4: Excel was used to solve the VLE problems along with the thermodynamic property estimation. A course project was also given for practice. Action-5: A MATLAB based GUI was developed for students' use to make them understand the mathematics behind McCabe-Thiele method for distillation column design.			
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations			
PO3	2.00	2.73	1. Students expressed need for greater understanding on design of process and plant for chemical industry; 2. Students lack in understanding the integrated approach for design of a process / equipment.
Action-1: Introducing Project-based Learning in the upcoming curriculum, which allow students to understand the design of process or plant for a selected chemical. Action -2: The black-box type of models (especially with process simulation software) was made clear to the students by developing the equations based on the fundamental conservation equations, which are the backbone for any simulation software. Action-3: All the problems in Computational Methods in Chemical Engineering course were designed based on the concepts in Chemical Engineering, where students are required to develop mathematical equations based on the first principle. These developed equations were solved using MATLAB.			
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions			
PO4	2.00	2.69	1. Students found difficulties in solving complex problems such as design of non-isothermal and multi-tubular packed bed reactor design. These complex problems require time. 2. Students found difficulties with the mathematics involved in boundary layer problems (CHE410)

<table>
<tr><th colspan="4">POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)</th></tr>
<tr><th>PO#</th><th>Target Level</th><th>Attainment Level</th><th>Observations</th></tr>
<tr><td colspan="4">Action 1: To aid in better fundamental understanding of complex systems which require more time from students to investigate complex problems, projects were introduced as part of continuous assessment, which allow students to spend more time in learning the complex problems, especially for non-isothermal design.

Action 2: For Multi-input and Multi-output (MIMO) problems in Process Control, which involves multiple transfer functions and multiple manipulating variables (such as control of distillation column) were given as course projects, which enables the students for better understanding of the problems.

Action 3: All the B.Tech projects are must to have a research components enabling the students to explore the recent trends for a defined problem. Further, for those students for above a CGPA of 8.0 to be eligible for distinction, they are required to publish a Scopus indexed paper.</td></tr>
<tr><td colspan="4">PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations</td></tr>
<tr><td>PO5</td><td>2.00</td><td>2.70</td><td>1. Students find difficulties in solving multiple Nonlinear equations encountered in Chemical Reaction Equilibrium (CHE311).
2. Insufficiency of Scientific calculators for solving optimized reactor volume in mixed flow reactors in series and mixed flow reactors and plug flow reactor combination.
Students were not able to solve the problems involving Equations of State, Vapor-Liquid Equilibrium, Flash separation, and Multi-phase reactive systems (CHE212).
3. Calculators are not sufficient for solving Composition and Temperature Control Problems (Process Control).
4. Simplification of complicated problems like distillation column design using McCabe-Thiele method using necessary mathematical and numerical techniques is required.</td></tr>
<tr><td colspan="4">Action 1: Use Microsoft-Excel (Solver module) for solving problems related to Chemical Reaction Equilibrium, with constraint specifications.

Action 2: Use Microsoft-Excel (Goal seek module) for constraint-based solution procedure for solving Vapor-Liquid-Equilibrium (VLE), Flash Separation problems.

Action 3: Microsoft-Excel based macro for Newton Raphson method for solving Equation of state problems to find the phase of a substance or a mixture at a given temperature and pressure.</td></tr>
</table>

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
Action 4: Use Multiple Linear Regression for obtaining kinetic rate parameters in heterogeneous reactions. Action 5: An user-friendly GUI based on MATLAB has been developed and circulated amongst students for distillation column design.			
PO6 : The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice			
PO6	2.00	2.73	1. There is a need for the students to understand the contemporary societal needs in the areas of food, health, safety, hygiene, energy security, and economic empowerment. 2. Students need to develop local solutions based on the problem. This requires students to visit the place to identify the problem. The students require some more time to propose and implement the solution. 3. Justify based on EVS and Live-in-Labs; solutions for contemporary social needs developed via department projects, entrepreneurship competitions, and projects identified by ACIP
Action 1: A new elective (named Live-in Labs) was proposed for the new curriculum to enable the students to spend time in the places where there is a societal need. Action 2: As part of Computer Aided Design of Chemical processes and Process Integration, the concepts of process integration for energy savings and profitability need to be addressed. Action 3: Professional ethics needs to be integrated into the curriculum as part of first year course.			
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development			
PO7	2.00	2.65	1. Identification of solutions that are sustainable need to be understood in detail based on the location. 2. Students lack in understanding the big picture on the sustainability. Solving only one of the problems related to food, energy, waste management and water etc., might make the others unsustainable.
Action 1: Peer teaching as part of Environmental Science (ENV 300) course to discuss the different sustainability methodologies. Action 2: Organic farming procedures were adapted as student projects to practice sustainability.			

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
Action 3: Motivating students to participate in competitions related to sustainability. Action 4: FDPs to be conducted for the faculty on sustainability and sustainable development. Action 5: Case studies to be formulated for sustainable solutions in energy, waste and water together rather than providing a separate solution for each of them.			
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice			
PO8	2.00	2.78	1. Students lack in discipline and ethics to followed in the industry after their employment.
Action 1: Professional ethics need to integrated as part of the curriculum in the first year itself. Action 2: Need to obtain feedback from students after every internship that they will undergo.			
PO9 : Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings			
PO9	2.00	2.82	1. Students lack in individual contribution when working in groups. 2. As part of Advanced Topics in Chemical Engineering course, students have been asked to select a journal article of their choice based on their interest. Students lack in individual effort to choose the article.
Action 1: The final year project is broken into minor task to build integrity within the group yet not compromising on the effective function as an individual. Action 2: To improve the individual and multidisciplinary learning, students are given challenged problems as course level projects, where in students are required to combine all the concepts that were learned in a single course. Action 3: The mode of the Advanced topics in Chemical Engineering was changed to project based learning course, which is a combination of team and individual work.			
PO10 : Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions			
PO10	2.00	2.76	1. Students require improvements in writing technical reports and formatting the reports
Action 1: The course project reports needs a general template, which makes the students to write more organized reports. Action 2: The final year project is broken into minor task to build integrity within the group yet not compromising on the effective function as an individual.			

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
Action 3: To improve the individual and multidisciplinary learning, students are given challenged problems as course level projects, where in students are required to combine all the concepts that were learned in a single course.			
PO11 : Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments			
PO11	2.00	2.83	1. Students lack in obtaining the specification of the parts /s consumables/ equipment required. 2. Students lack in how to obtain quotations for a purchase 3. Students lack in planning their work.
Action 1: The final year project must have research component, which improves individual learning. This will also demonstrates the team management, time management. This is ensured during regular reviews from semester 7 onwards. Action 2: The final year project is broken into minor task to build integrity within the group yet not compromising on the effective function as an individual. Action 3: To improve the individual and multidisciplinary learning, students are given challenged problems as course level projects, where in students are required to combine all the concepts that were learned in a single course.			
PO12 : Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change			
PO12	2.00	2.70	1. Students needs improvement in independent and life long-learning 2. Students needs to be aware of current technological change / new technologies in Chemical and allied areas
Action 1: The final year project must have individual research component, which is individual in nature to bring individual learning. Action 2: All the course projects must be individual to enhance life-long learning. Action 3: Guest lectures to be conducted for the students by inhouse experts and from the institutions/industries experts to provide information about the technological change. Action 4: Process intensification is the new technological change in Chemical Engineering. An elective needs to be offered in the upcoming curriculum.			
PSO1 : Obtain, apply, and demonstrate knowledge of core concepts and principles associated with chemical engineering unit operations and unit processes, along with the associated ethics, economics, safety, and sustainability aspects required to work in manufacturing, service, and R&D sectors.			
PSO1	2.00	2.79	1. Students had difficulty in solving simultaneous material and energy balances in a reactive system; action taken was

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
			development of an excel module for solving such equations (to give a simulation experience) (CHE311). 2. Students expressed need for greater understanding on design of process and plant for chemical industry; 3. Students were experiencing difficulty with the mathematics portions such as introduction on vector algebra and differential equations was added, and pedagogy included homework assignments, tutorials and continuous assessment components; 4. Students lack in understanding the integrated approach for design of a process / equipment. 5. There is a need for the students to understand the contemporary societal needs in the areas of food, health, safety, hygiene, energy security, and economic empowerment. 6. Students lack in discipline and ethics to followed in the industry after their employment.
Action 1: Splitting of a single Chemical Reaction Engineering course into two courses. The first course primarily consists of kinetic and reactor design for homogeneous reactions and the second course on kinetics, transfer processes and reactor design for heterogeneous reactions. Action 2**:** To aid in better fundamental understanding of complex systems which require more time from students to investigate complex problems, projects were introduced as part of continuous assessment, which allow students to spend more time in learning the complex problems, especially for non-isothermal design. Action 3: For Multi-input and Multi-output (MIMO) problems in Process Control, which involves multiple transfer functions and multiple manipulating variables (such as control of distillation column) were given as course projects, which enables the students for better understanding of the problems. Action 4: All the B.Tech projects are must to have a research components enabling the students to understand what research is			
PSO2 : Formulate chemical engineering problems, and then apply computational and simulation tools to design, optimize and operate chemical processes that are effective, efficient, and sustainable, while being socially and environmentally responsible.			
PSO2	2.00	2.75	1. Students find difficulties in solving multiple Nonlinear equations encountered in Chemical Reaction Equilibrium. 2. Insufficiency of Scientific calculators for solving optimized reactor volume in mixed flow reactors in series and mixed flow reactors and plug flow reactor combination. 3. Students were not able to solve the problems involving Equations of State, Vapor-Liquid Equilibrium, Flash separation, and Multi-phase reactive systems (CHE212). 4. Calculators are not sufficient for solving Composition and

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
			Temperature Control Problems (Process Control). 5. Simplification of complicated problems like distillation column design using McCabe-Thiele method using necessary mathematical and numerical techniques is required." 6. Identification of solutions that are sustainable need to be understood in detail based on the location. 7. Students lack in understanding the big picture on the sustainability. Solving only one of the problems related to food, energy, waste management and water etc., will make the others unsustainable. 8. Students lack in discipline and ethics to followed in the industry after their employment
Action 1: Microsoft-Excel based macro for Newton Raphson method for solving Equation of state problems to find the phase of a substance or a mixture at a given temperature and pressure. Action 2: Use Multiple Linear Regression for obtaining kinetic rate parameters in heterogeneous reactions. Action 3: An user-friendly GUI based on MATLAB has been developed and circulated amongst students for distillation column design. Action 4: Make students use Aspen HYSYS (A Process simulation software) for all case studies to improve their understanding on how each subject in Chemical Engineering Curriculum are integrated. Action 5: Professional ethics need to integrated as part of the curriculum in the first year itself.			
PSO3 :Plan, design and conduct scientific experiments, analyse the data, apply critical thinking to make valid inferences, and prepare technical and scholarly reports that include management and economics.			
PSO3	2.00	2.83	1. Students require improvements in writing technical reports and formatting the reports. 2. Students need to develop local solutions based on the problem. This requires students to visit the place to identify the problem. The students require some more time to propose and implement the solution. 3. Students lack in obtaining the specification of the parts /s consumables/ equipment required. 4. Students lack in how to obtain quotations for a purchase 5. Students lack in planning their work.
Action 1: The final year project must have research component, which improves individual learning. This will also demonstrates the team management, time management. This is ensured			

POs & PSOs Attainment Levels and Actions for improvement – CAY (2014 - 2018 Batch)			
PO#	**Target Level**	**Attainment Level**	**Observations**
during regular reviews from semester 7 onwards. Action 2: The final year project is broken into minor task to build integrity within the group yet not compromising on the effective function as an individual. Action 3: As part of Computer Aided Design of Chemical processes and Process Integration, the concepts of process integration for energy savings and profitability need to be addressed. Action 4: Professional ethics needs to be integrated into the curriculum as part of first year course.			

7.2 Academic Audit and actions taken thereof during the period of Assessment (15)

(Academic Audit system/process and its implementation in relation to Continuous Improvement)

The academic audit system takes the inputs at different levels during a semester. The general process for the academic audit system conducted by academic audit advisory committee is presented in Figure 7.2.

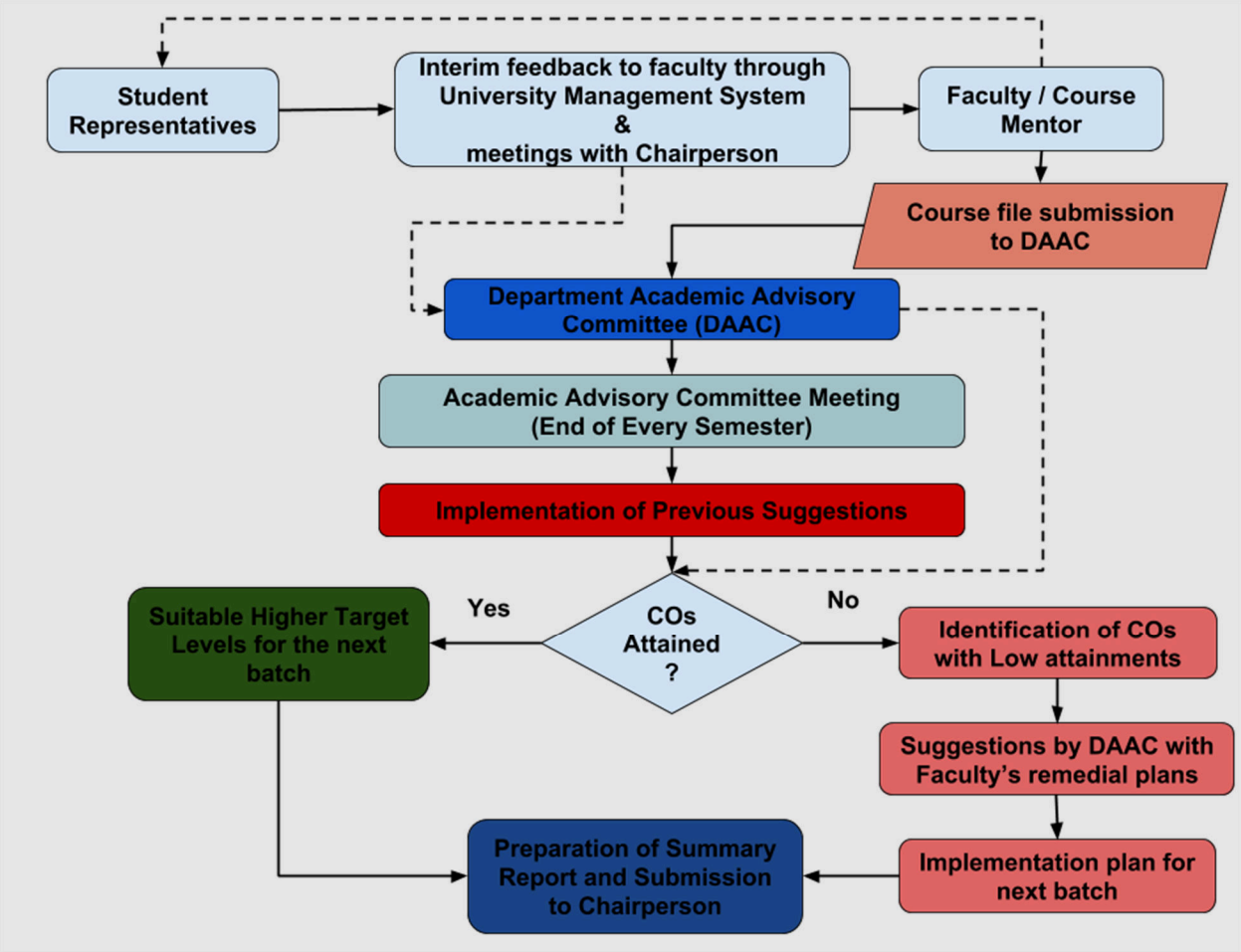


Figure 7.2 The Process of Academic Audit Committee

The summary report for a course by the Department Academic Advisory Committee (DAAC) is given in table B 7.2.

Table B.7.2 Summary of Academic Audit Report for a Course

Course Summary Report by Department Academic Advisory Committee									
			Interim Audit			***End Semester Audit***			
Course Code / Name	Name of the Faculty	Previous Suggestions (Yes / No)	% Syllabus completed	CO Attainment(s)	Suggestions / Remarks	% Syllabus completed	Overall CO Attainment	Suggestions implemented	Suggestions / Remarks (for Next Academic Year)

				CO 1 - CO 2 - CO 3 - CO 4 - CO 5 - CO 6 -			CO 1 - CO 2 - CO 3 - CO 4 - CO 5 - CO 6 -		

7.3 Improvement in Placement, Higher Studies and Entrepreneurship (10)

Assessment is based on improvement in:

Placement: number, quality placement, core industry, pay packages etc.

Higher studies: performance in GATE, GRE, GMAT, CAT etc., and admissions in premier institutions

Entrepreneurs

The data on placements, higher studies, entrepreneurship and ranks in national and international competitive exams is provided in the following sections:

7.3.1 Student Placement

The academic year-wise placement data from 2014-2015 is presented in Table B 7.3 A. The details of each students placed in each along with the company in which they are placed and pay package are provide in Table B. 7.3 B.

Table B 7.3.A : Year-wise Students' Placement during the Assessment Period

Year-wise student Placement	
Academic Year	***No. of Students Placed***
2015-2016	35
2016-2017	29
2017-2018	20

Table B 7.3.B : Details of the Students' Placement Along with Pay Package

Details of the Students Placed along with Pay Package				
S.No.	Name of the Student	Nature of the Industry Where the Student got Placed	Name of the Company / Organization	Pay Package (Rs. in Lakhs per Annum)
Academic Year 2017 - 2018				
1	Saran S.	Core	HPCL	9.85
2	Akshya E.M.		CUMI	3.25
3	Jishnu K.		CUMI	3.25
4	Gopika Krishnakumar		FLSMIDTH	4.50
5	Abinav Omkarnath	Others	Accenture	3.50
6	Durgasree		Accenture	3.50
7	Palaniappan R.		Accenture	3.50
8	Rejo Radhakrishnan		Accenture	3.50
9	Sathish Kumar A.		Accenture	3.50
10	Akhil T.		Federal Bank	4.00
11	Balaji S.		TCS	3.33
12	Saran S.		TCS	3.33
13	V. Shenbagavalli		TCS	3.33
14	J. Subasini		TCS	3.33
15	Vinayakram T.S.		TCS	3.33
16	R. Namitha		Infosys	3.25
17	Paritala Raga Sreehitha		Infosys	3.25
18	Pradeep K.		Infosys	3.25
19	Sowmiya C.F.		Infosys	3.25
20	Tamilarasan T.		Infosys	3.25

Details of the Students Placed along with Pay Package				
S.No.	Name of the Student	Nature of the Industry Where the Student got Placed	Name of the Company / Organization	Pay Package (Rs. in Lakhs per Annum)
Academic Year 2016 - 2017				
1	Balamurali S E	Core	Thirumalai Chemicals Ltd.	3.5
2	Gangatharan M		Gofrugal - MMS/ Berger Paints	5
3	Kaushik Ganesan		FLSmidth / CTS	4.5
4	Pavithra R		FLSmidth	4.5
5	Nidhin T Madhu		CUMI / Infosys	3.25
6	Vignesh Mahalingam		CUMI / CTS	3.25
7	Prakash M		SPIC	4.5
8	Sanganathan A		SPIC	4.5
9	Subeesh Kannan P		SPIC / CTS	4.5
10	Adarsh Ramesh	Other	Amazon-CS	3
11	E Harshita		Amazon-CS	3
12	Naveen Balaji N		Amazon-CS	3
13	V Aarathi		CTS	3.35
14	Aishwarya Lakshmi S		CTS	3.35
15	Anusha R		CTS	3.35
16	Aruna C M		CTS	3.35
17	Deekshitha Adapa		CTS	3.35
18	Divya R		CTS	3.35

Details of the Students Placed along with Pay Package				
S.No.	Name of the Student	Nature of the Industry Where the Student got Placed	Name of the Company / Organization	Pay Package (Rs. in Lakhs per Annum)
19	E R Lakshmi Narayanan		CTS	3.35
20	Pooja A		CTS	3.35
21	Sanha Kaizer Tajamul Basha		CTS	3.35
22	S Sruthi		CTS	3.35
23	Mythili Ananth		Infosys	3.25
24	S Nandita		Infosys	3.25
25	Praveen S		Infosys	3.25
26	Nandhini G R		Federal Bank	3.8
27	Ashwini U Menon		FIITJEE	6
28	Ramya P		FIITJEE	6
29	R Roshan Shrivatsav		TCS	3.33
Academic Year 2015 - 2016				
1	Samik Sen	Core	SPIC	2.4
2	C. Sivarama Krishnan		SPIC	2.4
3	Shashank Suresh		Sanmar Engg	3.59
4	Abhinav N.R.	Other	Cognizant	3.35
5	Abhiram Ashok		Cognizant	3.35
6	Anjana Suresh		Cognizant	3.35
7	Arun Meyappan V.		Cognizant	3.35
8	Arvind Ravindran		Cognizant	3.35

Details of the Students Placed along with Pay Package				
S.No.	Name of the Student	Nature of the Industry Where the Student got Placed	Name of the Company / Organization	Pay Package (Rs. in Lakhs per Annum)
9	B.R. Chanakya		Cognizant	3.35
10	T. Deepak		Cognizant	3.35
11	Garimella Lakshmi Goutham		Cognizant	3.35
12	Haritha M.		Cognizant	3.35
13	Haritha P.S.		Cognizant	3.35
14	Karthika Prahsanth Pattath		Cognizant	3.35
15	Krishnaa Suresh		Cognizant	3.35
16	N.S. Nagaarjun		Cognizant	3.35
17	Aparna Ramesh		WIPRO	3.25
18	Malavika Dinarajan		WIPRO	3.25
19	C. Mohhamed Aseeb		INFOSYS	3.25
20	Sreedhar Harigovind		INFOSYS	3.25
21	Vaishnav Raj K.S.		INFOSYS	3.25
22	Pokuri Annapoorna Pooja		Cognizant	3.35
23	Prabhav Santosh Menon		Cognizant	3.35
24	Rahul Rajan Babu		Cognizant	3.35
25	Revathy Nair		Cognizant	3.35
26	Shobana M.		Cognizant	3.35
27	M. Shobana Meenakshi		Cognizant	3.35

Details of the Students Placed along with Pay Package				
S.No.	Name of the Student	Nature of the Industry Where the Student got Placed	Name of the Company / Organization	Pay Package (Rs. in Lakhs per Annum)
28	Sreejaya K.H.		Cognizant	3.35
29	Sreevathsan S.		Cognizant	3.35
30	Sri Nithya Rupine A.		Cognizant	3.35
31	Srirag Ramachandran		Cognizant	3.35
32	Subhiksha R.		Cognizant	3.35
33	Vignesh S.		Cognizant	3.35
34	V. Kaarthik Raja		TCS	3.33
35	Naguru Phani Pavan Kumar Reddy		TCS	3.33

7.3.2 Students Going for Higher Studies

The total number of students admitted to higher studies are given in Table B 7.3.C.

Table B 7.3.C : Students Admitted to Higher Studies

Students Going for Higher Studies (Year-wise)	
Academic Year	*No. of Students Admitted for Higher-studies*
2014-2015	20
2015-2016	11
2016-2017	10
2017-2018	12

Table 7.3.D : Details of the Students Admitted to Higher Studies

Details of the Students Admitted to Higher Studies									
S.No.	**Academic year**	**Name of student**	**Higher education institute, Place**	**Course**	**Score in GATE**	**Score in GRE**	**Score in TOEFL**	**Score in CAT**	**Score in IELTS**
1	2017-2018	Akshay Menon	KTH Royal Institute of Technology, Stockholm, Sweden	KTH Masters Programme: Chemical Engineering for Energy and Environment (TKEMM)					7.5
2	2017-2018	Pravin Parasakhti Aravindan	University of Southern California,	MS,Chemical Engineering		316.5	95		
3	2017-2018	Janani K	BITS Pilani,Hyderabad	ME:Chemical	AIR: 3177, Score :321				
4	2017-2018	Keerthana	Johns Hopkins University,University in Baltimore,Maryland	JHU:MSE Biomedical Engineering		323			8
5	2017-2018	Sanjay Krishna	University of Waterloo	Chemical Engineering, Master of Engineering			103		
6	2017-2018	Saran S	IIT Bombay	M.Tech Chemical Engineering	AIR: 59	313			

Details of the Students Admitted to Higher Studies									
S.No.	**Academic year**	**Name of student**	**Higher education institute, Place**	**Course**	**Score in GATE**	**Score in GRE**	**Score in TOEFL**	**Score in CAT**	**Score in IELTS**
					,Score:799				
7	2017-2018	Shrividya G	NUS, Singapore	MSc Chemical Engineering					
8	2017-2018	Vyshnavi Ulattil	TU Delft, Delft University of Technology,Netherlands	MSc Master Engineering and Policy Analysis					7.5
9	2017-2018	Rashmi B	IIT Madras	M.S+Ph.D, Chemical Engineering	AIR: 919,Score: 548				
10	2017-2018	Pushkala V.	IIT Madras	M.S+Ph.D, Chemical Engineering	AIR: 1447, Score :480				
11	2017-2018	Lakshmi Satish Nair	TU Delft, Delft University of Technology,Netherlands	MSc. Master Materials Science and Engineering		317			8
12	2017-2018	Prithvi G	BITS Pilani, KK Birla, Goa Campus	Post graduate					

Details of the Students Admitted to Higher Studies									
S.No.	**Academic year**	**Name of student**	**Higher education institute, Place**	**Course**	**Score in GATE**	**Score in GRE**	**Score in TOEFL**	**Score in CAT**	**Score in IELTS**
1	2016-2017	Amritasree Menon	TU Delft	MS Sustainability Management					
2	2016-2017	Anjali Suresh	University of Wisconsin,Madison Graduate School	Materials Science and Engineering MS		312.5	98		
3	2016-2017	Aarthi V	University of Maryland	Masters in Chemical and Biomolecular Engineering		313	110		
4	2016-2017	Aruna C M	National University of Singapore	M.S. Chemical Engineering	616	311			
5	2016-2017	Deekshitha Adapa	University of South Florida	M.S. Chemical Engineering		303	95		
6	2016-2017	Sruthi S.	University of Pittsburgh	Ph.D. Tissue Engineering					
7	2016-2017	Ganagatharan M.		PG Diploma in -----					
8	2016-2017	Bhavanitha V.	MBA	Thiagrajar College of Engineering					

Details of the Students Admitted to Higher Studies									
S.No.	**Academic year**	**Name of student**	**Higher education institute, Place**	**Course**	**Score in GATE**	**Score in GRE**	**Score in TOEFL**	**Score in CAT**	**Score in IELTS**
9	2016-2017	Mythili Ananth							
10	2016-2017	Sanha Kaizer Tajamul Basha	MS - University of Tsukuba, Tsukuba, Japan	Environmental Science and Technology	Japanese Embassy Examination		107		
1	2015-2016	Aparna Ramesh	NC state University, North Carolina	Masters in Environmental Process Engineering					
2	2015-2016	Karthik Raja	BITS Pilani, KK Birla, Goa Campus	Ph.D in BITS Pilani	AIR: 2235; Score :370(Year: 2016)				
3	2015-2016	Haritha P S	IIT Kharagpur	M.Tech Chemical Engineering	AIR: 999;Score: 521(2017)				
4	2015-2016	Malavika D	IIT Bombay	M.Tech Chemical Engineering					
5	2015-2016	Vaishnav Raj K.S.	National Taiwan University	MS in Chemical Engineering					

Details of the Students Admitted to Higher Studies									
S.No.	**Academic year**	**Name of student**	**Higher education institute, Place**	**Course**	**Score in GATE**	**Score in GRE**	**Score in TOEFL**	**Score in CAT**	**Score in IELTS**
6	2015-2016	Sri Nithya Rupine	TU Delft	Sustainable Energy Technology					
7	2015-2016	Arun Meyappan	TU Delft	Sustainable Energy Technology			98		
8	2015-2016	Karthika Pattath	TU Delft						
9	2015-2016	Revathi	TU Delft						
10	2015-2016	Vignesh S.							
11	2015-2016	Anjana Suresh	TU Delft						

7.4 Improvement in the quality of students admitted to the program (20)

Assessment is based on improvement in terms of ranks/score in qualifying state level/national level entrances tests, percentage marks in Physics, Chemistry and Mathematics in 12th Standard and percentage marks of the lateral entry students.

Table B.7.4. Quality of the Students Admitted to the Program

Item		CAY	CAYm1	CAYm2
National Level Entrance Examination (Name of the Examination)	No. of Students admitted	N.A.	N.A.	N.A.
	Opening Score/Rank	N.A.	N.A.	N.A.
	Closing Score/Rank	N.A.	N.A.	N.A.

Item		CAY	CAYm1	CAYm2
State/Institute/Level Entrance Examination/Others (Amrita Engineering Entrance Examination)	No. of Students admitted	53	57	43
	Opening Score/Rank	810	2385	604
	Closing Score/Rank	25919	21567	18688
Name of the Entrance Examination for Lateral Entry or lateral entry details	No. of Students admitted	N.A.	N.A.	N.A.
	Opening Score/Rank	N.A.	N.A.	N.A.
	Closing Score/Rank	N.A.	N.A.	N.A.
Average CBSE/Any other Board Result of admitted students (Physics, Chemistry & Mathematics) in %		85.19	86.50	85.52

INSTITUTE-LEVEL CRITERIA

CRITERION 8: First Year Academics (50)

8.1. First Year Student-Faculty Ratio (FYSFR) (5)

Data for first year courses to calculate the FYSFR:

Table B.8.1.

Year	Number of students (approved intake strength)	Number of faculty members (considering fractional load)	FYSFR	*Assessment = (5 ×20)/FYSFR (Limited to Max. 5)
CAY	1380	79	17.47	5
CAYm1	1242	74	16.78	5
CAYm2	1020	65	15.69	5
Average	1214	72.67	16.65	5

8.2. Qualification of Faculty Teaching First Year Common Courses (5)

Assessment of qualification = $(5x + 3y)/RF$, x= Number of Regular Faculty with Ph.D., y = Number of Regular Faculty with Post-graduate qualification RF= Number of faculty members required as per SFR of 20:1, Faculty definition as defined in 5.1

Table B.8.2

Year	*X*	*Y*	*RF*	Assessment of faculty qualification $(5x + 3y)/RF$
CAY	63	16	69	5.26
CAYm1	56	18	62.1	5.38
CAYm2	46	19	51	5.63
AVERAGE	55.00	17.67	60.70	5.42

8.3. First Year Academic Performance (10)

Table B.8.3.1

FIRST YEAR ACADEMIC PERFORMANCE OF THE STUDENTS FOR THE YEAR 2017-2018				
DEPARTMENT	NUMBER OF STUDENTS APPEARED IN THE EXAM	NUMBER OF SUCCESSFUL STUDENTS	TOTAL GRADE POINT OF ALL SUCCESSFUL STUDENTS	TOTAL GRADE POINT AVERAGE OF ALL SUCCESSFUL STUDENTS
			TOTAL	TOTAL
AEROSPACE ENGINEERING	60	60	890.83	7.42
CHEMICAL ENGINEERING	57	57	751.29	6.59
CIVIL ENGINEERING	59	59	792.29	6.71
COMPUTER SCIENCE AND ENGINEERING	397	397	5947.98	7.49
ELECTRONICS AND COMMUNICATION ENGINEERING	264	264	3938.94	7.46
ELECTRICAL AND ELECTRONICS ENGINEERING	108	108	1563.33	7.24
ELECTRONICS AND INSTRUMENTATION ENGINEERING	50	50	695.20	6.95
MECHANICAL ENGINEERING	244	244	3609.64	7.40
TOTAL	**1239**	**1239**	**18189.50**	**7.34**

Table B.8.3.2

FIRST YEAR ACADEMIC PERFORMANCE OF THE STUDENTS FOR THE YEAR 2016-2017				
DEPARTMENT	NUMBER OF STUDENTS APPEARED IN THE EXAM	NUMBER OF SUCCESSFUL STUDENTS	TOTAL GRADE POINT OF ALL SUCCESSFUL STUDENTS	TOTAL GRADE POINT AVERAGE OF ALL SUCCESSFUL STUDENTS
			TOTAL	TOTAL
AEROSPACE ENGINEERING	56	56	882.75	7.88
CHEMICAL ENGINEERING	43	43	654.5	7.61
CIVIL ENGINEERING	65	65	944.17	7.26
COMPUTER SCIENCE AND ENGINEERING	377	377	5927.31	7.86
ELECTRONICS AND COMMUNICATION ENGINEERING	197	197	3021.95	7.67
ELECTRICAL AND ELECTRONICS ENGINEERING	123	123	1847.38	7.51
ELECTRONICS AND INSTRUMENTATION ENGINEERING	51	51	754.32	7.40
MECHANICAL ENGINEERING	191	191	2984.49	7.81
TOTAL	**1103**	**1103**	**17016.87**	**7.71**

Table B.8.3.3

FIRST YEAR ACADEMIC PERFORMANCE OF THE STUDENTS FOR THE YEAR 2015-2016				
DEPARTMENT	NUMBER OF STUDENTS APPEARED IN THE EXAM	NUMBER OF SUCCESSFUL STUDENTS	TOTAL GRADE POINT OF ALL SUCCESSFUL STUDENTS	TOTAL GRADE POINT AVERAGE OF ALL SUCCESSFUL STUDENTS
			TOTAL	TOTAL
AEROSPACE ENGINEERING	48	48	731.00	7.61
CHEMICAL ENGINEERING	60	60	916.49	7.64
CIVIL ENGINEERING	63	63	941.98	7.48
COMPUTER SCIENCE AND ENGINEERING	285	285	4282.30	7.51
ELECTRONICS AND COMMUNICATION ENGINEERING	182	182	2609.57	7.17
ELECTRICAL AND ELECTRONICS ENGINEERING	108	108	1601.42	7.41
ELECTRONICS AND INSTRUMENTATION ENGINEERING	64	64	939.85	7.34
MECHANICAL ENGINEERING	185	185	2782.04	7.52
TOTAL	995	995	14804.65	7.44

8.4. Attainment of Course Outcomes of first year courses (10)

8.4.1. Describe the assessment processes used to gather the data upon which the evaluation of Course Outcomes of first year is done (5)

The CO attainment is computed at Amrita School of Engineering, Coimbatore using the **Inpods Software**. The following procedure is followed to do the computation.

Step 1:	Faculty sets the assessment question paper with CO mapping, BTL mapping and Marks of each question.
Step 2:	Faculty enters the step 1 data in Inpods software and the bundle number is generated. Bundle Number is the unique number (Spread sheet) for a exam for a particular course for a particular class.
Step 3:	The answer paper is evaluated by the faculty and is shared with the students for verification.
Step 4:	The front sheet of the answer paper which contains the question wise mark is torn and collected back by the faculty.
Step 5:	Faculty sends those front sheet along with bundle number generated in step 2 to the data entry team
Step 6:	Data entry team enters the marks of each students, question wise, in the Inpods software with the help of bundle number(spread sheet).
Step 7:	The entry will be done by the faculty for assignment and quiz in inpods.
Step 8:	Step 1 to Step 6 will be followed for Periodicals 1, Periodicals 2 and End Semester.
Step 9:	The Course Attainment-Direct is computed by the Inpods software.

The process followed at Amrita School of Engineering, Coimbatore for CO computation in a theory course is given in Figure 3.2.1. In the CO attainment calculation for a course, 80% is contributed through direct and 20% through Indirect. As per the university regulation, 50% of the direct is contributed by Cumulative Internal Examination (CIE) and 50% from Semester End Examinations (SEE) for theory courses. In the CIE, Periodical 1, Periodical 2 and Continuous Assessment contributes 15, 15 and 20 respectively. For Lab courses, 80% and 20% is contributed by continuous assessment and end semester examinations respectively to the direct attainment.

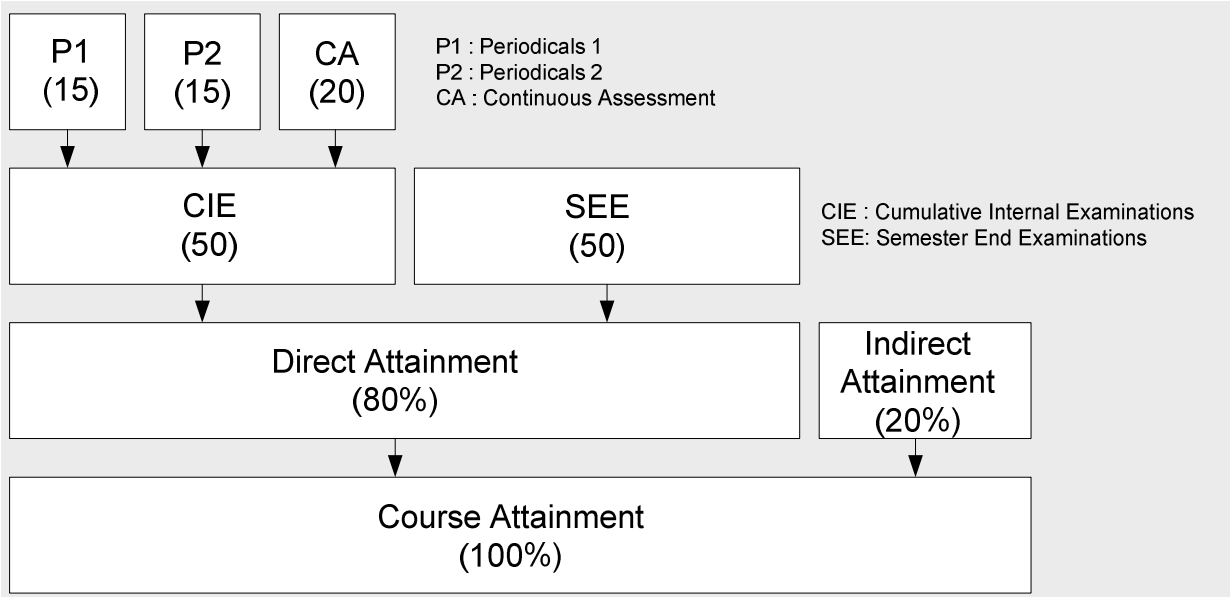
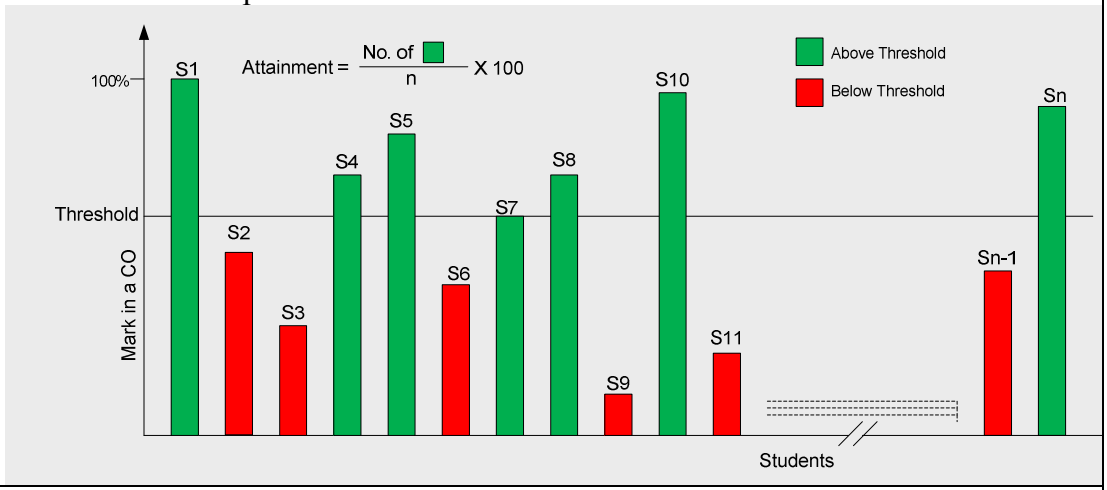


Figure 3.2.1 CO attainment for theory courses

Inpods does the attainment calculation based on the following expression:

Direct	The direct part of the CO attainment is computed through exams. The percentage of students in the class who scored more than threshold percentage of marks in the respective CO is the attainment. 
Indirect	Based on Survey $$Attainment = \frac{\sum_{i=1}^{5} i * no.of\ students\ gave\ i\ option}{5 * no.of\ responses}$$

3.3.1. Describe the assessment tools and processes used for measuring the attainment of each Program Outcomes and Program Specific Outcomes (10)

The PO/PSO attainment is computed through direct and indirect. The direct part is computed through the attainment of COs from all courses, using the Course Articulation Matrix (CAM). The indirect attainments of the POs are computed through survey among stakeholders as shown in Figure 3.3.1.

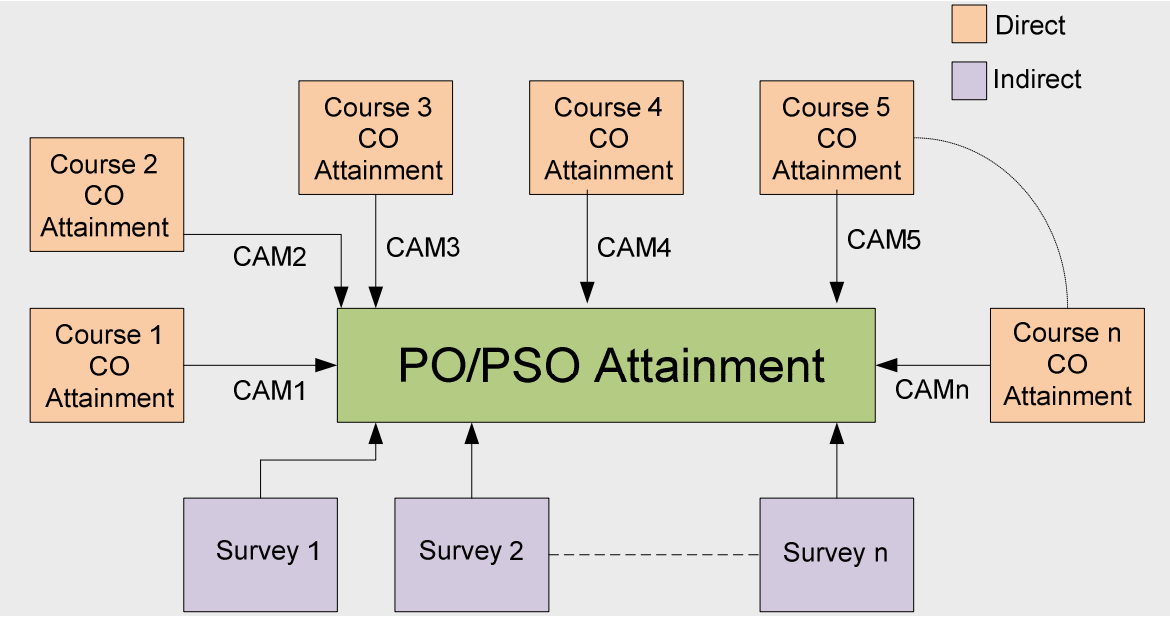


Figure 3.3.1. PO/PSO attainment

PO/PSO Attainment is Computed based on the following expressions

Direct	**Attainment of PO/PSO through a Course:** PO_{ij} Attainment = $\frac{\sum_{k=1}^{COmax} CA_k * CAM_{ik}}{\sum_{k=1}^{COmax} CAM_{ik}}$ Where, PO_{ij} is the Attainment of 'i' th PO through the course 'j' COmax is the maximum number of COs in the course 'j' CA is Course Attainment CAM_{ik} is the Course Articulation matrix for the 'i' th PO for the course 'j' with 'k' COs **Attainment of PO/PSO through all courses** Poi Attainment = Average across all Courses Addressing that POs/PSOs
Indirect	**Based on Survey** $PO_i = \frac{\sum_{i=1}^{5} i * no.of\ students\ gave\ i\ option}{5 * no.of\ responses}$ Where, PO_i is the attainment of the 'i'th PO

8.4.2. Record the attainment of Course Outcomes of all first year courses (5)

Program shall have set attainment levels for all first year courses

Level (3)	**>**	**60**
Level (2)	**>**	**40**
Level (1)	**>**	**0**
Level (0)	**0-50**	

For 2010 onwards.

Table B.8.4.2a: CO-Attainment Level-2014-2015

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6
CSE100	Computer Programming	2.6	2.6	2.6	2.6		
CSE180	Computer Programming Lab	2.0	2.0	2.0	2.0		
CUL101	Cultural Education -1	2.6	2.6	2.6	2.6	2.6	
CUL102	Cultural Education-2	2.6	2.6	2.6	2.6	2.6	
ECE100	Electronics Engineering	2.5	2.5	2.5	2.5		
EEE100	Electrical Engineering	1.5	2.0	2.0	2.0	2.0	
EEE180	Workshop B	1.2	1.2	1.2	1.2		
ENG111	Communicative English	2.6	2.6	2.6	2.6	2.6	
ENG112	Technical Communication	3.0	3.0	3.0	3.0	3.0	
MAT111	Calculus, Matrix Algebra	2.5	2.5	2.5	2.5	2.5	2.5
MAT112	Vector Calculus and Ordinary Differential Equations	2.2	2.6	2.6	2.6	2.6	2.6
MEC181	Engineering Drawing	2.5	2.5	2.5	2.5	2.5	2.5
MEC182	CAD	2.5	2.5	2.5	2.5		
MEC100	Engineering Mechanics	2.2	1.8	1.8	2.2	2.3	
MEC180	Workshop A	2.0	2.0	2.0	2.0		
CHY100	Chemistry	1.8	2.2	2.2			
CHY181	Chemistry Lab.	2.6	2.6	2.6	2.6	2.6	
PHY100	Physics	2.6	2.6	2.6			
PHY181	Physics Lab	3.0	3.0	3.0			

Table B.8.4.2b: **CO-Attainment Percentage-2014-2015**

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6
CSE100	Computer Programming	62.33	66.11	64.90	66.22		
CSE180	Computer Programming Lab	54.44	55.41	55.20	54.44		
CUL101	Cultural Education -1	68.26	72.09	70.00	72.74	72.98	
CUL102	Cultural Education-2	85.68	89.15	89.75	89.99	89.85	
ECE100	Electronics Engineering	60.68	62.36	66.09	70.66		
EEE100	Electrical Engineering	39.26	47.71	57.91	63.04	63.04	
EEE180	Workshop B	23.35	23.35	23.35	23.35		
ENG111	Communicative English	67.72	78.88	72.67	66.30	66.74	
ENG112	Technical Communication	83.62	87.80	87.41	80.51	80.74	
MAT111	Calculus, Matrix Algebra	53.20	56.38	57.95	61.18	65.99	65.99
MAT112	Vector Calculus and Ordinary Differential Equations	58.57	69.67	61.42	60.16	63.82	66.58
MEC181	Engineering Drawing	63.10	63.10	63.10	63.10	63.10	63.10
MEC182	CAD	60.47	60.47	60.47	60.47		
MEC100	Engineering Mechanics	54.22	51.42	50.98	70.14	70.14	
MEC180	Workshop A	60.79	60.79	60.79	60.79		
CHY100	Chemistry	47.55	55.32	54.96			
CHY181	Chemistry Lab.	62.98	63.57	63.57	64.16	64.16	
PHY100	Physics	60.18	57.23	61.56			
PHY181	Physics Lab	86.45	86.45	86.45			

Table B.8.4.2c: **Sample Calculations of CO-Attainment 2014-15**

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
CSE100	CO1	64.16	3	57.62	2	60.89	2.50	68.11	3	62.33	2.60	50.00	YES
	CO2	71.19	3	57.62	2	64.41	2.50	72.91	3	66.11	2.60	50.00	YES
	CO3	68.71	3	57.62	2	63.17	2.50	71.84	3	64.90	2.60	50.00	YES
	CO4	73.86	3	57.62	2	65.74	2.50	68.11	3	66.22	2.60	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
CSE180	CO1	54.36	2	52.18	2	53.27	2.00	59.15	2	54.44	2.00	50.00	YES
	CO2	54.36	2	52.18	2	53.27	2.00	64.00	3	55.41	2.20	50.00	YES
	CO3	54.36	2	52.18	2	53.27	2.00	62.92	3	55.20	2.20	50.00	YES
	CO4	54.36	2	52.18	2	53.27	2.00	59.15	2	54.44	2.00	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
ENG112	CO1	88.49	3	80.15	3	84.32	3.00	80.78	3	83.62	3.00	50.00	YES
	CO2	96.93	3	82.17	3	89.55	3.00	80.78	3	87.80	3.00	50.00	YES
	CO3	97.99	3	80.15	3	89.07	3.00	80.78	3	87.41	3.00	50.00	YES
	CO4	80.73	3	80.15	3	80.44	3.00	80.78	3	80.51	3.00	50.00	YES
	CO5	81.30	3	80.15	3	80.73	3.00	80.78	3	80.74	3.00	50.00	YES
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
MAT112	CO1	59.15	2	47.15	2	53.15	2.00	80.27	3	58.57	2.20	50.00	YES
	CO2	86.89	3	47.15	2	67.02	2.50	80.27	3	69.67	2.60	50.00	YES
	CO3	66.26	3	47.15	2	56.71	2.50	80.27	3	61.42	2.60	50.00	YES
	CO4	63.11	3	47.15	2	55.13	2.50	80.27	3	60.16	2.60	50.00	YES
	CO5	72.26	3	47.15	2	59.71	2.50	80.27	3	63.82	2.60	50.00	YES
	CO6	79.17	3	47.15	2	63.16	2.50	80.27	3	66.58	2.60	50.00	YES

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
CHY100	CO1	53.25	2	31.53	1	42.39	1.50	68.20	3	47.55	1.80	50.00	NO
	CO2	72.67	3	31.53	1	52.10	2.00	68.20	3	55.32	2.20	50.00	YES
	CO3	71.79	3	31.53	1	51.66	2.00	68.20	3	54.96	2.20	50.00	YES
	CO4												
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
CHY181	CO1	68.15	3	51.23	2	59.69	2.50	76.13	3	62.98	2.60	50.00	YES
	CO2	69.62	3	51.23	2	60.43	2.50	76.13	3	63.57	2.60	50.00	YES
	CO3	69.62	3	51.23	2	60.43	2.50	76.13	3	63.57	2.60	50.00	YES
	CO4	71.09	3	51.23	2	61.16	2.50	76.13	3	64.16	2.60	50.00	YES
	CO5	71.09	3	51.23	2	61.16	2.50	76.13	3	64.16	2.60	50.00	YES
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
PHY100	CO1	73.20	3	40.10	2	56.65	2.50	74.32	3	60.18	2.60	50.00	YES
	CO2	65.81	3	40.10	2	52.96	2.50	74.32	3	57.23	2.60	50.00	YES
	CO3	76.65	3	40.10	2	58.37	2.50	74.32	3	61.56	2.60	50.00	YES
	CO4												
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
PHY181	CO1	99.02	3	79.08	3	89.05	3.00	76.04	3	86.45	3.00	50.00	YES
	CO2	99.02	3	79.08	3	89.05	3.00	76.04	3	86.45	3.00	50.00	YES
	CO3	99.02	3	79.08	3	89.05	3.00	76.04	3	86.45	3.00	50.00	YES
	CO4												
	CO5												
	CO6												

For 2015 onwards.

Table B.8.4.2d: CO-Attainment Level 2015-2016

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15AES111	Introduction to Aerospace Technology	3.00	3.00	3.00	3.00	3.00	3.00		
15CHE111	Introduction to Chemical Engineering	2.20	3.00	3.00	2.20	3.00	3.00	3.00	3.00
15CHE112	Material Balances	3.00	2.20	2.20	2.20				
15CVL102	Mechanics: Statics and Dynamics	2.60	2.60	2.60	2.60	2.60			
15CVL111	Introduction to Civil Engineering	2.00	2.20	2.20					
15CVL112	Engineering Graphics-CAD	2.36	2.36	2.36	2.36	2.36			
15CSE100	Computational Thinking and Problem Solving	3.00	3.00	3.00	3.00				
15CSE102	Computer Programming	2.20	2.20	2.20	2.20				
15CSE111	Computer Science Essentials	2.40	2.60	2.60	2.40	2.20	2.40		
15CSE180	Computer Programming Lab	2.00	2.20	2.20	2.00				
15CUL101	Cultural Education -1	2.60	2.60	2.60	2.60	2.60			
15CUL111	Cultural Education-2	3.00	3.00	3.00	3.00	3.00			
15ECE111	Solid State Devices	2.00	2.00	2.00	2.00	2.00			
15ECE112	Fundamentals of Electrical Technology	2.00	1.50	2.00	2.00	2.00	2.00		
15EEE111	Fundamentals of Electrical and Electronics Engineering	2.20	2.60	2..20	2.60	2.60	2.60		
15EEE180	Workshop B	2.20	2.20	2.20	2.20				
15ENG111	Communicative English I	3.00	3.00	3.00	3.00	3.00			
15MAT111	Calculus, Matrix Algebra	3.00	3.00	3.00	3.00	3.00	3.00		
15MAT121	Vector Calculus and Ordinary Differential Equations	2.60	2.60	2.60	2.60	2.60	2.60		
15MEC100	Engineering Drawing -CAD	2.60	2.60	2.60	2.60	2.60	3.00		
15MEC101	Engineering Drawing-CAD-II	3.00	3.00	3.00	3.00	3.00			
15MEC102	Engineering Mechanics	2.60	2.60	2.47	2.60	2.60			

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15MEC111	Fundamentals of Mechanical Engineering	1.80	1.80	2.20	2.20	2.20			
15MEC180	Workshop A	2.20	2.20	2.20	2.20				
15CHY100	Chemistry	2.60	2.60	2.60					
15CHY181	Chemistry Lab.	2.60	2.60	2.60	2.60	2.60			
15PHY100	Physics	2.60	2.60	2.60					
15PHY181	Physics Lab	3.00	3.00	3.00					

Table B.8.4.2e: CO-Attainment Percentage- 2015-2016

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15AES111	Introduction to Aerospace Technology	80.20	84.87	84.87	86.53	86.53	86.53		
15CHE111	Introduction to Chemical Engineering	64.31	69.67	73.67	61.67	67.03	77.67	81.67	67.03
15CHE112	Material Balances	66.56	58.56	55.84	62.56				
15CVL102	Mechanics: Statics and Dynamics	65.37	67.09	76.71	72.09	67.79			
15CVL111	Introduction to Civil Engineering	41.00	50.30	52.40					
15CVL112	Engineering Graphics-CAD	63.75	65.30	65.84	66.24	67.18			
15CSE100	Computational Thinking and Problem Solving	86.26	85.15	86.35	86.01				
15CSE102	Computer Programming	64.52	57.15	61.65	59.68				
15CSE111	Computer Science Essentials	64.83	71.86	67.30	72.74	66.33	70.74		
15CSE180	Computer Programming Lab	48.55	50.35	49.95	48.55				
15CUL101	Cultural Education -1	72.24	74.07	72.73	73.14	71.76			
15CUL111	Cultural Education-2	83.07	83.86	81.95	83.66	85.15			
15ECE111	Solid State Devices	50.76	53.26	56.52	65.29	65.29			
15ECE112	Fundamentals of Electrical Technology	42.29	42.91	50.20	50.20	64.26	64.26		

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15EEE111	Fundamentals of Electrical and Electronics Engineering	59.97	61.74	60.89	74.42	69.69	75.77		
15EEE180	Workshop B	64.82	64.82	64.82	64.82				
15ENG111	Communicative English I	87.14	90.46	90.89	83.71	83.94			
15MAT111	Calculus, Matrix Algebra	80.87	84.54	86.36	81.10	82.65	83.96		
15MAT121	Vector Calculus and Ordinary Differential Equations	64.55	66.31	65.03	61.40	70.38	72.60		
15MEC100	Engineering Drawing - CAD	63.85	63.85	63.85	63.85	63.85	75.00		
15MEC101	Engineering Drawing-CAD-II	69.45	69.45	69.45	69.45	69.45			
15MEC102	Engineering Mechanics	77.80	72.33	68.96	80.54	80.54			
15MEC111	Fundamentals of Mechanical Engineering	47.74	49.53	53.10	62.74	63.31			
15MEC180	Workshop A	61.00	61.00	61.00	61.00				
15CHY100	Chemistry	62.20	66.59	67.06					
15CHY181	Chemistry Lab.	71.53	71.53	71.53	71.53	71.53			
15PHY100	Physics	69.19	66.72	64.52					
15PHY181	Physics Lab	91.34	91.34	91.34					

Table B.8.4.2f: Sample Calculations of CO-Attainment 2015-16

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15CSE 100	CO1	90.84	3	86.74	3	88.79	3.00	76.15	3	86.26	3.00	50.00	YES
	CO2	88.21	3	86.74	3	87.48	3.00	75.84	3	85.15	3.00	50.00	YES
	CO3	91.33	3	86.74	3	89.04	3.00	75.60	3	86.35	3.00	50.00	YES
	CO4	90.35	3	86.74	3	88.55	3.00	75.85	3	86.01	3.00	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15CSE 102	CO1	93.59	3	29.64	1	61.61	2.00	76.15	3	64.52	2.20	50.00	YES
	CO2	75.32	3	29.64	1	52.48	2.00	75.84	3	57.15	2.20	50.00	YES
	CO3	86.69	3	29.64	1	58.16	2.00	75.60	3	61.65	2.20	50.00	YES
	CO4	81.63	3	29.64	1	55.64	2.00	75.85	3	59.68	2.20	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15ENG 111	CO1	93.25	3	84.28	3	88.77	3.00	80.66	3	87.14	3.00	50.00	YES
	CO2	101.54	3	84.28	3	92.91	3.00	80.66	3	90.46	3.00	50.00	YES
	CO3	102.60	3	84.28	3	93.44	3.00	80.66	3	90.89	3.00	50.00	YES
	CO4	84.67	3	84.28	3	84.47	3.00	80.66	3	83.71	3.00	50.00	YES
	CO5	85.25	3	84.28	3	84.76	3.00	80.66	3	83.94	3.00	50.00	YES
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15MAT 111	CO1	80.97	3	78.26	3	79.61	3.00	85.91	3	80.87	3.00	50.00	YES
	CO2	90.14	3	78.26	3	84.20	3.00	85.91	3	84.54	3.00	50.00	YES
	CO3	94.69	3	78.26	3	86.47	3.00	85.91	3	86.36	3.00	50.00	YES
	CO4	81.55	3	78.26	3	79.90	3.00	85.91	3	81.10	3.00	50.00	YES
	CO5	85.41	3	78.26	3	81.84	3.00	85.91	3	82.65	3.00	50.00	YES
	CO6	88.70	3	78.26	3	83.48	3.00	85.91	3	83.96	3.00	50.00	YES

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15MEC 100	CO1	54.12	2	64.46	3	59.29	2.50	82.10	3	63.85	2.60	50.00	YES
	CO2	54.12	2	64.46	3	59.29	2.50	82.10	3	63.85	2.60	50.00	YES
	CO3	54.12	2	64.46	3	59.29	2.50	82.10	3	63.85	2.60	50.00	YES
	CO4	54.12	2	64.46	3	59.29	2.50	82.10	3	63.85	2.60	50.00	YES
	CO5	54.12	2	64.46	3	59.29	2.50	82.10	3	63.85	2.60	50.00	YES
	CO6	69.44	3	77.01	3	73.23	3.00	82.10	3	75.00	3.00	50.00	YES

Table B.8.4.2g: CO-Attainment Level 2016-2017

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15AES111	Introduction to Aerospace Technology	2.60	3.00	2.60	2.20	2.20	2.60		
15CHE111	Introduction to Chemical Engineering	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
15CHE112	Material Balances	3.00	2.20	2.20	2.20				
15CVL102	Mechanics: Statics and Dynamics	2.20	1.80	2.20	2.20	2.20			
15CVL111	Introduction to Civil Engineering	2.20	2.20	2.20					
15CVL112	Engineering Graphics-CAD	2.60	2.60	2.60	2.60	2.60			
15CSE100	Computational Thinking and Problem Solving	3.00	3.00	3.00	3.00				
15CSE102	Computer Programming	2.80	3.00	3.00	2.80				
15CSE111	Computer Science Essentials	2.80	3.00	3.00	2.80	2.60	2.80		
15CSE180	Computer Programming Lab	2.40	2.60	2.60	2.40				
15CUL101	Cultural Education -1	3.00	3.00	3.00	3.00	3.00			
15CUL111	Cultural Education-2	3.00	3.00	3.00	3.00	3.00			
15ECE111	Solid State Devices	2.50	2.50	2.50	2.50	2.50			
15ECE112	Fundamentals of Electrical Technology	3.00	3.00	3.00	3.00	3.00	3.00		
15EEE111	Fundamentals of Electrical and Electronics Engineering	2.60	3.00	2.60	3.00	2.60	3.00		
15EEE180	Workshop B	2.60	2.60	2.60	2.60				
15ENG111	Communicative English I	3.00	3.00	3.00	3.00	3.00			
15MAT111	Calculus, Matrix Algebra	3.00	3.00	3.00	3.00	3.00	3.00		
15MAT121	Vector Calculus and Ordinary Differential Equations	3.00	3.00	3.00	3.00	3.00	3.00		
15MEC100	Engineering Drawing - CAD	3.00	3.00	3.00	3.00	3.00	3.00		
15MEC101	Engineering Drawing-CAD-II	3.00	3.00	3.00	3.00	3.00			

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15MEC102	Engineering Mechanics	3.00	3.00	3.00	3.00	3.00			
15MEC111	Fundamentals of Mechanical Engineering	3.00	3.00	2.60	3.00	3.00			
15MEC180	Workshop A	2.60	2.60	2.60	2.60				
15CHY100	Chemistry	3.00	3.00	3.00					
15CHY181	Chemistry Lab.	2.60	2.60	2.60	2.60	2.60			
15PHY100	Physics	2.60	2.60	2.60					
15PHY181	Physics Lab	3.00	3.00	3.00					

Table B.8.4.2h: CO-Attainment Percentage- 2016-2017

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15AES111	Introduction to Aerospace Technology	74.15	74.15	60.59	56.52	63.30	67.37		
15CHE111	Introduction to Chemical Engineering	86.83	97.71	90.43	70.43	84.99	81.31	83.15	79.55
15CHE112	Material Balances	69.32	56.60	56.60	58.44				
15CVL102	Mechanics: Statics and Dynamics	57.23	50.51	58.51	71.64	91.19			
15CVL111	Introduction to Civil Engineering	70.15	67.69	79.15					
15CVL112	Engineering Graphics-CAD	71.58	68.77	70.18	70.18	70.18			
15CSE100	Computational Thinking and Problem Solving	79.50	79.22	78.99	80.80				
15CSE102	Computer Programming	72.29	73.32	79.66	77.43				
15CSE111	Computer Science Essentials	71.47	77.26	73.51	76.94	71.35	74.94		
15CSE180	Computer Programming Lab	56.75	58.05	57.65	56.25				
15CUL101	Cultural Education -1	89.93	93.43	93.72	94.53	94.68			
15CUL111	Cultural Education-2	87.75	89.18	89.08	89.90	89.37			

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15ECE111	Solid State Devices	56.82	58.08	64.14	67.17	67.93			
15ECE112	Fundamentals of Electrical Technology	75.70	75.70	75.70	75.70	83.94	83.94		
15EEE111	Fundamentals of Electrical and Electronics Engineering	71.77	72.05	75.09	79.24	77.72	80.75		
15EEE180	Workshop B	74.38	74.38	74.38	74.38				
15ENG111	Communicative English I	80.29	81.72	81.72	77.58	77.58			
15MAT111	Calculus, Matrix Algebra	75.38	75.83	86.40	73.64	75.49	75.34		
15MAT121	Vector Calculus and Ordinary Differential Equations	78.45	82.76	85.55	79.78	81.38	82.18		
15MEC100	Engineering Drawing -CAD	74.94	75.16	75.11	74.94	74.95	80.98		
15MEC101	Engineering Drawing-CAD-II	76.74	76.74	83.68	76.74	86.74			
15MEC102	Engineering Mechanics	82.00	77.92	78.13	86.90	86.90			
15MEC111	Fundamentals of Mechanical Engineering	79.79	68.41	67.71	69.44	78.75			
15MEC180	Workshop A	60.33	60.33	60.33	60.33				
15CHY100	Chemistry	75.89	77.85	77.11					
15CHY181	Chemistry Lab.	66.69	66.69	66.69	66.69	66.69			
15PHY100	Physics	72.25	69.51	70.50					
15PHY181	Physics Lab	91.44	91.44	91.44					

Table B.8.4.2i: **Sample Calculations of CO-Attainment 2016-17**

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15CSE 102	CO1	80.36	3	72.85	3	76.61	3.00	55.00	2	72.29	2.80	50.00	YES
	CO2	78.46	3	72.85	3	75.66	3.00	64.00	3	73.32	3.00	50.00	YES
	CO3	95.29	3	72.85	3	84.07	3.00	62.00	3	79.66	3.00	50.00	YES
	CO4	93.21	3	72.85	3	83.03	3.00	55.00	2	77.43	2.80	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15ENG 111	CO1	96.96	3	62.32	3	79.64	3.00	82.88	3	80.29	3.00	50.00	YES
	CO2	100.54	3	62.32	3	81.43	3.00	82.88	3	81.72	3.00	50.00	YES
	CO3	100.54	3	62.32	3	81.43	3.00	82.88	3	81.72	3.00	50.00	YES
	CO4	90.18	3	62.32	3	76.25	3.00	82.88	3	77.58	3.00	50.00	YES
	CO5	90.18	3	62.32	3	76.25	3.00	82.88	3	77.58	3.00	50.00	YES
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15MAT 121	CO1	81.24	3	73.33	3	77.29	3.00	83.11	3	78.45	3.00	50.00	YES
	CO2	92.00	3	73.33	3	82.67	3.00	83.11	3	82.76	3.00	50.00	YES
	CO3	86.48	3	73.33	3	79.90	3.00	83.11	3	80.55	3.00	50.00	YES
	CO4	84.57	3	73.33	3	78.95	3.00	83.11	3	79.78	3.00	50.00	YES
	CO5	88.57	3	73.33	3	80.95	3.00	83.11	3	81.38	3.00	50.00	YES
	CO6	90.57	3	73.33	3	81.95	3.00	83.11	3	82.18	3.00	50.00	YES

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15MEC 180	CO1	76.57	3	43.21	2	59.89	2.50	62.09	3	60.33	2.60	50.00	YES
	CO2	76.57	3	43.21	2	59.89	2.50	62.09	3	60.33	2.60	50.00	YES
	CO3	76.57	3	43.21	2	59.89	2.50	62.09	3	60.33	2.60	50.00	YES
	CO4	76.57	3	43.21	2	59.89	2.50	62.09	3	60.33	2.60	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15PHY 100	CO1	83.60	3	59.87	2	71.73	2.50	74.33	3	72.25	2.60	50.00	YES
	CO2	76.74	3	59.87	2	68.30	2.50	74.33	3	69.51	2.60	50.00	YES
	CO3	79.22	3	59.87	2	69.54	2.50	74.33	3	70.50	2.60	50.00	YES
	CO4												
	CO5												
	CO6												

Table B.8.4.2j: CO-Attainment Level 2017-2018

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15AES111	Introduction to Aerospace Technology	2.50	2.50	2.50	2.50	2.50	2.50		
15CHE111	Introduction to Chemical Engineering	3.00	3.00	3.00	3.00	2.00	3.00	3.00	3.00
15CHE112	Material Balances	3.00	3.00	3.00	2.00				
15CVL102	Mechanics: Statics and Dynamics	2.60	2.60	2.20	2.20	2.20			
15CVL111	Introduction to Civil Engineering	2.60	2.60	2.60					
15CVL112	Engineering Graphics-CAD	3.00	2.68	3.00	2.68	3.00			
15CSE100	Computational Thinking and Problem Solving	3.00	3.00	3.00	3.00				
15CSE102	Computer Programming	2.80	3.00	2.60	1.60				
15CSE111	Computer Science Essentials	2.80	3.00	3.00	2.80	2.60	2.80		
15CSE180	Computer Programming Lab	2.20	2.20	2.20	2.00				
15CUL101	Cultural Education -1	3.00	3.00	3.00	3.00	3.00			
15CUL111	Cultural Education-2	3.00	3.00	3.00	3.00	3.00			
15ECE111	Solid State Devices	2.00	2.00	2.00	2.00	2.00			
15ECE112	Fundamentals of Electrical Technology	2.00	3.00	2.50	2.50	2.50	2.00		
15EEE111	Fundamentals of Electrical and Electronics Engineering	2.60	2.60	3.00	2.60	3.00	2.60		
15EEE180	Workshop B	2.00	2.00	2.00	2.00				
15ENG111	Communicative English I	3.00	2.52	3.00	3.00	2.82			
15MAT111	Calculus, Matrix Algebra	3.00	3.00	3.00	3.00	3.00	3.00		
15MAT121	Vector Calculus and Ordinary Differential Equations	3.00	3.00	3.00	3.00	3.00	3.00		
15MEC100	Engineering Drawing -CAD	2.60	2.60	2.60	2.60	2.60	3.00		
15MEC101	Engineering Drawing-CAD-II	3.00	3.00	3.00	3.00	3.00			
15MEC102	Engineering Mechanics	3.00	3.00	3.00	3.00	3.00			
15MEC111	Fundamentals of Mechanical Engineering	2.20	2.20	2.20	2.20	2.20			
15MEC180	Workshop A	3.00	3.00	3.00	3.00				

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15CHY100	Chemistry	2.60	2.60	2.60					
15CHY181	Chemistry Lab.	2.60	2.60	2.60	2.60	2.60			
15PHY100	Physics	2.60	2.60	2.60					
15PHY181	Physics Lab	3.00	3.00	3.00					

Table B.8.4.2k: CO-Attainment Percentage- 2017-2018

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
15AES111	Introduction to Aerospace Technology	53.97	60.32	58.73	58.73	61.90	63.49		
15CHE111	Introduction to Chemical Engineering	60.07	75.82	61.45	62.62	57.90	62.04	73.10	80.63
15CHE112	Material Balances	72.77	72.84	65.83	59.59				
15CVL102	Mechanics: Statics and Dynamics	70.22	65.62	70.65	65.36	61.70			
15CVL111	Introduction to Civil Engineering	57.02	60.29	62.67					
15CVL112	Engineering Graphics-CAD	85.92	89.00	84.79	87.78	82.30			
15CSE100	Computational Thinking and Problem Solving	79.47	77.67	79.49	79.38				
15CSE102	Computer Programming	68.08	67.55	59.23	37.21				
15CSE111	Computer Science Essentials	71.11	75.56	73.63	76.95	69.20	74.95		
15CSE180	Computer Programming Lab	56.95	58.75	58.35	56.95				
15CUL101	Cultural Education -1	81.90	83.87	79.77	81.78	83.31			
15CUL111	Cultural Education-2	82.98	81.10	78.29	78.82	79.96			
15ECE111	Solid State Devices	52.70	50.06	51.51	50.51	51.58			
15ECE112	Fundamentals of Electrical Technology	59.16	65.92	52.15	65.92	71.65	64.65		
15EEE111	Fundamentals of Electrical and	66.86	58.84	66.59	70.20	79.96	69.57		

COURSE TITLE	COURSE	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8
	Electronics Engineering								
15EEE180	Workshop B	67.83	67.83	67.83	67.83				
15ENG111	Communicative English I	74.44	85.94	82.32	72.09	69.95			
15MAT111	Calculus, Matrix Algebra	72.79	74.86	85.31	71.83	73.84	73.43		
15MAT121	Vector Calculus and Ordinary Differential Equations	76.56	81.49	78.92	77.74	79.20	80.40		
15MEC100	Engineering Drawing -CAD	70.83	70.83	70.83	70.83	70.83	80.81		
15MEC101	Engineering Drawing-CAD-II	81.54	81.54	81.54	81.54	81.54			
15MEC102	Engineering Mechanics	80.47	80.65	80.17	86.64	86.64			
15MEC111	Fundamentals of Mechanical Engineering	62.53	61.79	68.46	69.20	69.57			
15MEC180	Workshop A	74.77	74.77	74.77	74.77				
15CHY100	Chemistry	68.23	68.24	71.47					
15CHY181	Chemistry Lab.	65.68	65.68	65.68	65.68	65.68			
15PHY100	Physics	71.16	68.54	69.82					
15PHY181	Physics Lab	88.01	88.01	88.01					

Table B.8.4.2l: **Sample Calculations of CO-Attainment 2017-18**

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15CSE 180	CO1	56.56	2	58.33	2	57.44	2.00	55.00	2	56.95	2.00	50.00	YES
	CO2	56.56	2	58.33	2	57.44	2.00	64.00	3	58.75	2.20	50.00	YES
	CO3	56.56	2	58.33	2	57.44	2.00	62.00	3	58.35	2.20	50.00	YES
	CO4	56.56	2	58.33	2	57.44	2.00	55.00	2	56.95	2.00	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15MEC 100	CO1	83.89	3	56.22	2	70.06	2.50	73.91	3	70.83	2.60	50.00	YES
	CO2	83.89	3	56.22	2	70.06	2.50	73.91	3	70.83	2.60	50.00	YES
	CO3	83.89	3	56.22	2	70.06	2.50	73.91	3	70.83	2.60	50.00	YES
	CO4	83.89	3	56.22	2	70.06	2.50	73.91	3	70.83	2.60	50.00	YES
	CO5	83.89	3	56.22	2	70.06	2.50	73.91	3	70.83	2.60	50.00	YES
	CO6	91.95	3	73.13	3	82.54	3.00	73.91	3	80.81	3.00	50.00	YES

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15MEC 180	CO1	86.59	3	62.74	3	74.67	3.00	75.19	3	74.77	3.00	50.00	YES
	CO2	86.59	3	62.74	3	74.67	3.00	75.19	3	74.77	3.00	50.00	YES
	CO3	86.59	3	62.74	3	74.67	3.00	75.19	3	74.77	3.00	50.00	YES
	CO4	86.59	3	62.74	3	74.67	3.00	75.19	3	74.77	3.00	50.00	YES
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15CH Y181	CO1	80.87	3	45.92	2	63.40	2.50	74.82	3	65.68	2.60	50.00	YES
	CO2	80.87	3	45.92	2	63.40	2.50	74.82	3	65.68	2.60	50.00	YES
	CO3	80.87	3	45.92	2	63.40	2.50	74.82	3	65.68	2.60	50.00	YES
	CO4	80.87	3	45.92	2	63.40	2.50	74.82	3	65.68	2.60	50.00	YES
	CO5	80.87	3	45.92	2	63.40	2.50	74.82	3	65.68	2.60	50.00	YES
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15PHY 100	CO1	84.25	3	57.18	2	70.71	2.50	72.96	3	71.16	2.60	50.00	YES
	CO2	77.28	3	57.18	2	67.23	2.50	73.82	3	68.54	2.60	50.00	YES
	CO3	80.56	3	57.18	2	68.87	2.50	73.63	3	69.82	2.60	50.00	YES
	CO4												
	CO5												
	CO6												

Course	COs	Internal Examination (CIE)		End Semester Examination (SEE)		Direct 50% of CIE and 50% of SEE		Indirect		Final Course Attainment 80% of Direct and 20% of Indirect		Target (%)	Attainment Yes/No
		Attainment	Level	Attainment	Level	Attainment*	Level	Attainment	Level	Attainment	Level		
15PHY 181	CO1	98.63	3	82.96	3	90.80	3.00	76.87	3	88.01	3.00	50.00	YES
	CO2	98.63	3	82.96	3	90.80	3.00	76.87	3	88.01	3.00	50.00	YES
	CO3	98.63	3	82.96	3	90.80	3.00	76.87	3	88.01	3.00	50.00	YES
	CO4												
	CO5												
	CO6												

8.5. Attainment of Program Outcomes from first year courses (20)

8.5.1. Indicate results of evaluation of each relevant PO and/or PSO if applicable (10)

Table B.8.5.1a: PO-Attainment 2014-2015.

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Computer Programming	CSE100	2.64	2.65	2.66									
Computer Programming Lab	CSE180	2.27	2.27	2.27		2.33							
Cultural Education -1	CUL101						2.99	2.99	2.99	2.99	2.99	2.99	2.99
Cultural Education-2	CUL102						3.00	3.00	3.00	3.00	3.00	3.00	3.00
Electronics Engineering	ECE100	2.52	2.53	2.59									2.52
Electrical Engineering	EEE100	1.71	1.67										
Workshop B	EEE180	1.25	1.25	1.25						1.25			1.25
Communicative English	ENG111								2.61	2.66	2.63		2.63
Technical Communication	ENG112								2.98	2.98	2.98		2.98
Calculus, Matrix Algebra	MAT111	2.04	2.05										
Vector Calculus and Ordinary Differential Equations	MAT112	2.38	2.40	2.39									2.38
Engineering Drawing	MEC181	2.61	2.61	2.61	2.61		2.61				2.61		2.61
CAD	MEC182	2.39	2.39	2.39		2.39					2.39		2.39
Engineering Mechanics	MEC100	1.99	1.99	1.98	1.99								1.99
Workshop A	MEC180	2.33	2.33	2.33		2.33				2.33	2.33		2.33

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Chemistry	CHY100	1.85	2.11	2.13	2.13								
Chemistry Lab.	CHY181	2.61	2.61	2.61									
Physics	PHY100	2.27	2.27										2.27
Physics Lab	PHY181	2.93	2.93	2.93	2.93	2.93	2.93						

Table B.8.5.1b: PO-Attainment 2015-2016

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Introduction to Aerospace Technology	**15AES111**	3	3		3		3	3		3	3		3
Introduction to Chemical Engineering	**15CHE111**	2.55	3.00		3.00	2.00			3.00				
Material Balances	**15CHE112**	2.25	2.25	2.20	2.00								
Mechanics: Statics and Dynamics	**15CVL102**	2.6	2.6										
Introduction to Civil Engineering	**15CVL111**	2					2.2	2.2		2.2			
Engineering Graphics-CAD	**15CVL112**	2.36	2.36	2.36	2.36	2.36							2.36
Computational Thinking and Problem Solving	**15CSE100**	3.00	3.00	3.00		3.00			3.00	3.00	3.00		

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Computer Programming	**15CSE102**	2.27	2.27	2.27									
Computer Science Essentials	**15CSE111**	2.54	2.52	2.52									
Computer Programming Lab	**15CSE180**	2.05	2.03	2.05		2.15							
Cultural Education -1	**15CUL101**						2.63	2.63	2.63	2.63	2.63	2.63	2.63
Cultural Education-2	**15CUL111**						2.50	2.50	2.50	2.50	2.50	2.50	2.50
Solid State Devices	**15ECE111**	2.00	2.00										2.00
Fundamentals of Electrical Technology	**15ECE112**	1.87	1.88	1.83									1.93
Fundamentals of Electrical and Electronics Engineering	**15EEE111**	2.44	2.37	2.62									
Workshop B	**15EEE180**	2.39	2.39	2.39					2.39	2.39	2.39		2.39
Communicative English I	**15ENG111**								2.95	2.95	2.95		2.95
Calculus, Matrix Algebra	**15MAT111**	2.95	2.95	2.95									2.95
Vector Calculus and Ordinary Differential Equations	**15MAT121**	2.41	2.39	2.39									2.42
Engineering Drawing -CAD	**15MEC100**	2.50	2.50	2.50	2.51		2.51				2.50		2.51
Engineering Drawing-CAD-II	**15MEC101**	2.60	2.60	2.60	2.60		2.60				2.60		2.60

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Engineering Mechanics	**15MEC102**	2.57	2.57	2.57	2.57								2.57
Fundamentals of Mechanical Engineering	**15MEC111**	2.12	2.13	2.13	2.13		2.20	2.20		2.12			2.10
Workshop A	**15MEC180**	2.49	2.49	2.49		2.49				2.49	2.49		2.49
Chemistry	**15CHY100**	2.58	2.60	2.60	2.60								
Chemistry Lab.	**15CHY181**	2.78	2.78	2.78									
Physics	**15PHY100**	2.61	2.61										2.61
Physics Lab	**15PHY181**	2.99	2.99	2.99	2.99	2.99	2.99						

Table B.8.5.1c: PO-Attainment 2016-2017

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Introduction to Aerospace Technology	**15AES111**	2.53	2.60		2.40		2.67	2.44		2.80	2.50		2.42
Introduction to Chemical Engineering	**15CHE111**	3.00	3.00		3.00	3.00			3.00				
Material Balances	**15CHE112**	2.25	2.25	2.20	2.00								

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Mechanics: Statics and Dynamics	**15CVL102**	2.12	2.12										
Introduction to Civil Engineering	**15CVL111**	2.2					2.2	2.2		2.2			
Engineering Graphics-CAD	**15CVL112**	2.6	2.6	2.6	2.6	2.6							2.6
Computational Thinking and Problem Solving	**15CSE100**	2.95	2.95	2.95		2.95			2.95	2.95	2.95		
Computer Programming	**15CSE102**	2.88	2.90	2.92									
Computer Science Essentials	**15CSE111**	2.75	2.72	2.72									
Computer Programming Lab	**15CSE180**	2.37	2.35	2.37		2.47							
Cultural Education - 1	**15CUL101**						2.60	2.60	2.60	2.60	2.60	2.60	2.60
Cultural Education-2	**15CUL111**						2.58	2.58	2.58	2.58	2.58	2.58	2.58
Solid State Devices	**15ECE111**	2.43	2.43										2.43
Fundamentals of Electrical Technology	**15ECE112**	3.00	3.00	3.00									3.00
Fundamentals of Electrical and Electronics Engineering	**15EEE111**	2.80	2.77	2.87									
Workshop B	**15EEE180**	2.76	2.76	2.76					2.76	2.76	2.76		2.76

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Communicative English I	**15ENG111**								2.72	2.72	2.72		2.72
Calculus, Matrix Algebra	**15MAT111**	2.85	2.85	2.85									2.86
Vector Calculus and Ordinary Differential Equations	**15MAT121**	3.00	2.99	3.00									2.99
Engineering Drawing -CAD	**15MEC100**	2.89	2.89	2.89	2.89		2.89				2.89		2.89
Engineering Drawing-CAD-II	**15MEC101**	2.97	2.97	2.97	2.97		2.97				2.97		2.97
Engineering Mechanics	**15MEC102**	3.00	3.00	3.00	3.00								3.00
Fundamentals of Mechanical Engineering	**15MEC111**	2.92	2.89	2.91	2.94		3.00	2.90					2.90
Workshop A	**15MEC180**	2.52	2.52	2.52		2.52				2.52	2.52		2.52
Chemistry	**15CHY100**	2.89	2.89	2.87	2.87								
Chemistry Lab.	**15CHY181**	2.72	2.72	2.72									
Physics	**15PHY100**	2.70	2.70										2.70
Physics Lab	**15PHY181**	2.99	2.99	2.99	2.99	2.99	2.99						

Table B.8.5.1d: PO-Attainment 2017-2018

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Introduction to Aerospace Technology	**15AES111**	2.2	2.2		2.2		2.2	2.2		2.2	2.2		2.2
Introduction to Chemical Engineering	**15CHE111**	2.20	2.60		2.20	2.20			3.00				
Material Balances	**15CHE112**	2.04	0.86			3.00							
Mechanics: Statics and Dynamics	**15CVL102**	2.36	2.36										
Introduction to Civil Engineering	**15CVL111**	2.6					2.6	2.6		2.6			
Engineering Graphics-CAD	**15CVL112**	2.87	2.87	2.87	2.87	2.87							2.87
Computational Thinking and Problem Solving	**15CSE100**	2.90	2.90	2.90		2.90			2.90	2.90	2.90		
Computer Programming	**15CSE102**	2.41	2.29	2.37									
Computer Science Essentials	**15CSE111**	2.75	2.72	2.72									
Computer Programming Lab	**15CSE180**	2.44	2.42	2.44		2.54							
Cultural Education - 1	**15CUL101**						2.54	2.54	2.54	2.54	2.54	2.54	2.54

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Cultural Education-2	**15CUL111**						2.47	2.47	2.47	2.47	2.47	2.47	2.47
Solid State Devices	**15ECE111**	2.05	2.05										2.05
Fundamentals of Electrical Technology	**15ECE112**	2.42	2.40	2.41									2.37
Fundamentals of Electrical and Electronics Engineering	**15EEE111**	2.58	2.62										
Workshop B	**15EEE180**	2.36	2.36	2.36					2.36	2.36	2.36		2.36
Communicative English I	**15ENG111**								2.76	2.46	2.83		2.70
Calculus, Matrix Algebra	**15MAT111**	2.80	2.80	2.80									2.82
Vector Calculus and Ordinary Differential Equations	**15MAT121**	2.94	2.95	2.95									2.94
Engineering Drawing -CAD	**15MEC100**	2.86	2.86	2.86	2.86		2.86				2.86		2.86
Engineering Drawing-CAD-II	**15MEC101**	3.00	3.00	3.00	3.00		3.00				3.00		3.00
Engineering Mechanics	**15MEC102**	3.00	3.00	3.00	3.00								3.00
Fundamentals of Mechanical Engineering	**15MEC111**	2.40	2.40	2.40	2.40		2.40	2.40		2.40			2.40

COURSE TITLE	COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Workshop A	**15MEC180**	2.91	2.91	2.91		2.91				2.91	2.91		2.91
Chemistry	**15CHY100**	2.60	2.60	2.60									
Chemistry Lab.	**15CHY181**	2.75	2.75	2.75									
Physics	**15PHY100**	2.67	2.67										2.67
Physics Lab	**15PHY181**	2.97	2.97	2.97	2.97	2.97	2.97						

8.5.2. Actions taken based on the results of evaluation of relevant POs and PSOs (10)

(The attainment levels by direct (student performance) are to be presented through Program-level Course-PO matrix as indicated)

Table B.8.5.2: PO Attainment Levels and Actions for improvement – CAY only – Mention for relevant POs

POs	Target Level	Attainment Level	Observations
PO1: Engineering Knowledge			
PO1	**2.0**	**2.5**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15ASE111, 15MEC111, and 15ECE111 for which attainment contributions were comparatively lower.
Action 1: Include more examples involving applications of fundamentals in lectures. **Action 2:** Practical applications of engineering drawing skills are incorporated in the next syllabus revision. **Action 3:** Focus to enhance student's skill in CAD software. Course content is oriented towards the same. **Action 4:** More focus on discussions related to approaching a problem, using foundational engineering knowledge for solving problem is included.			
PO2: Problem Analysis			
PO2	**2.0**	**2.5**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15ASE111, 15CVL102, 15MEC111, and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: Motivate the students to learn on their own and give presentations in class. **Action 2**: Scope of the course is widened to incorporate more fundamental topics in the next syllabus revision.			

POs	Target Level	Attainment Level	Observations
Action 3: Course delivery to focus more on fundamental concepts and usage of the same to solve complex problems. **Action 4:** Solving numerical problems as typical examples on all topics within the class room.			
PO3: Design/Development of Solutions			
PO3	**2.0**	**2.6**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15MEC111, and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: Every lecture topic is accompanied by sample codes for different problem scenarios. The lectures also include code walk-through which discusses more the problem solving aspect rather than syntax. **Action 2:** The evaluation lab questions demand the students to code solutions for real-world problem scenarios. **Action 3:** In addition, the evaluation rubric places almost equal weightage on the design of solutions in par with the implementation			
PO4: Conduct Investigations of complex problems			
PO4	**2.0**	**2.1**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15MEC111, and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: The complex building drawings are separated by simple components for better understanding. **Action 2:** More fundamental topics are included in the next syllabus revision. **Action 3:** Course delivery to focus more on fundamental concepts and usage of the same to solve complex problems.			
PO5 :**Modern tools usage**			
PO5	**2.0**	**2.8**	The overall target for the PO has been attained sufficiently. No further action is planned.
Action 1: N/A			

POs	Target Level	Attainment Level	Observations
PO6 : Engineer and Society			
PO6	**2.0**	**2.3**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15MEC111, and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: The practical project helps in motivating the students about the importance of civil engineering in community building. **Action 2:** Ought to connect the course content to the practical engineering design. Course delivery will be oriented towards the relevant practical applications of concepts. **Action 3:** Ought to connect the course content to the practical engineering design. Course delivery will be oriented towards the relevant practical applications of concepts.			
PO7 : Environment and Sustainability			
PO7	**2.0**	**2.4**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15ASE111 and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: Stress on the importance and need to create sustainable and green solutions in future in class lectures. **Action 2:** The students are aware of the different branches of civil engineering with their applications**.** **Action 3:** Presentations from students will be encouraged.			
PO8 : Ethics			
PO8	**2.0**	**2.3**	The overall target for the PO has been attained. A general observation is that there is low motivation among the engineering students for studying ethics. They are not adequately convinced of the relevance of ethics in their professional and

POs	Target Level	Attainment Level	Observations
			personal life. The following actions will be taken in the spirit of continuous improvement.
Action 1: The relevance of ethics will be better explained to the students through the Cultural Education and Amrita Values Program courses. **Action 2:** The chairperson and senior faculty members in the department will emphasize the importance of these courses in the professional and personal life of the students**.**			
PO9 : Individual & Teamwork			
PO9	**2.0**	**2.5**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15MEC100 and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: The relation between different branches of civil engineering should be emphasized among the students. **Action 2:** Students are encouraged to work out/ discuss about real time problems applying the fundamentals learned.			
PO10 : Communication			
PO10	**2.0**	**2.4**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15MEC100, 15MEC101 15MEC111, and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: Give more opportunities for the students to communicate in the form of class presentations and written reports and give feedback to them for improvement in these areas**.** **Action 2:** Will offer a session on line strokes that highlights the concept of depth of field in engineering drawing.			
PO11 : Project management & Finance			
PO11	**2.0**	**2.5**	The target has been attained. No further action is planned.
Action 1: N/A			

POs	Target Level	Attainment Level	Observations
PO12 : Lifelong learning			
PO12	**2.0**	**2.5**	The overall target for the PO has been attained. In the spirit of continuous improvement, the following corrective action will be taken for the courses 15ASE111, 15MEC111, and 15ECE111, for which attainment contributions were comparatively lower.
Action 1: Course delivery to be oriented towards linking the fundamental concepts to practical usage. **Action 2:** Explain the relevance of the course in student's career and highlight each of its contents relevance in future. **Action 3:** The correlation of the learned principles with the application levels are elaborated to the students through simple examples**.**			

CRITERION 9: Student Support Systems (50)

9.1 Mentoring system to help at individual level (5)

Amrita's approach to mentoring and counseling the students is guided by the vision of imparting a value based education to our students. The role of a dedicated and hardworking faculty body is vital towards achieving this objective. A balanced and effective mentoring is in place, maintaining a healthy relationship between faculty members and students. Mentoring and counseling are planned for the following aspects:

- Improve Academic performance.
- Develop a Research Orientation
- Guidance for Professional Career, Higher Studies & Skill Development
- Resolve Personal Issues: Behavioral; psychological
- Encourage Spirit of Innovation by motivating and training students to participate in Contests, Conferences, Projects and Internships
- Motivate to pursue Extra-curricular and Social activities
- Encourage students to participate in Cultural activities, Arts and Sports.
- Develop Personality and Character
- Foster Good Values, Healthy living and Discipline.

Student Portfolio

The Student Portfolio with personal details along with their academic performance and progress is maintained as follows:

- Personal file: A detailed personal file is maintained in the School Administration Office, recording all relevant aspects of a student (Annexure B.9.1[1]). This is supplemented by two automated software.

[1] All annexures for Criterion 9 (B.9.1 to B.9.20) have not been included in the SAR report and will be available in the institute during inspection.

· Amrita University Management System (AUMS) Software: A master database holding all academic records(Annexure B.9.2).

· Campus Management System (CMS): A database containing essential information, both academic (operational) and non-academic elements, required for effective mentoring and counseling of students at multiple levels. The information is stored as Work Registers, Counseling Diaries, Achievements, and Disciplinary actions (Annexure B.9.3, 9.4, 9.5, 9.6).

The Mentoring Structure

An effective student mentoring and counseling system has been implemented in the institution. The Department Chairperson assisted by Department Vice Chairperson(s) steer, direct and oversee this vital aspect:-

· **Class Advisors:** Class Advisors (CA) are appointed for every 20 students when the students join for the UG programme. Class Advisors so nominated hold the responsibility until the students complete the programme. The CAs will maintain all records of their respective wards assigned to them in the work register/ counseling diary in the CMS. They shall guide and counsel the students on maintaining good academic performance, attendance and discipline. They shall advise the students, monitor the courses undergone by them, monitor their performance in tests and also look into their personal difficulties. Advisor also keeps track of Co-curricular, Extra Curricular achievements and Social activities. This will be frequently reviewed by the Department Chairperson. The CAs shall inform the parents regarding the academic progress and attendance percentages immediately after the periodical tests (Annexure B.9.7, 9.8).

· **Class Committee**: Class Committee comprises the Batch Coordinator, Class Advisors, faculty members teaching courses for all the sections, and student representatives. This committee is formed with the overall goal of improving the effectiveness of the teaching-learning process. In the two meetings held in a semester immediately after the periodical tests, feedback is taken from the student members representing the entire class, so as to improve the teaching-learning process and also to address other issues/grievances. The chairperson and teachers disseminate important activities in the department such as schedule of placement training classes, participation of students in extracurricular and co-curricular activities, conferences and workshops, internship

opportunities, industry training and also inviting volunteers for any planned central activities. The other aspects that may be addressed during the Class Committee meeting are:

§ Resolve any issues faced by students in the class room/ laboratories.

§ Clarify Rules & Regulations of the degree program.

§ Discuss the academic progress and the coverage of syllabus.

§ Analysis of student performance.

§ Identify slow learners, if any, and plan necessary support measures.

§ Track attendance shortage and caution students lacking the requisite percentage.

· **Course Committee**: The Course Committee consisting of the Course Mentor, Batch Coordinator and faculty members handling the course meet periodically to assess progress and monitor conduct of the course. The effectiveness and adequacy of counseling and mentoring actions are discussed and resolved in this forum.

The minutes of meetings are circulated to all concerned for further action. The Office of Dean Engineering is kept informed of points deserving his attention.

Academic Processes (Mentoring)

A systematic and structured orientation programme is conducted for the freshers, (both on academic and cultural aspects) as given below:-

· **Orientation of Fresher's (Academic)**

Amrita attracts UG students with varied academic (CBSE/ State Boards/ ICSE) and cultural backgrounds (from abroad as well). At the commencement of the academic programme, orientation training is imparted to freshers in two stages:-

§ Stage1: A School level orientation is organized over one full day. Attendance by parents as well ensures clear understanding of both academic, and living environment (Annexure B.9.9).

§ Stage 2: Conducted by respective departments over a period of 2 working days. (Annexure B.9.10)

· **Programme Specific**

§ Weekly Counseling Sessions: Counseling sessions are scheduled in the time-table. The faculty mentors discuss issues related to academics and grades with the assigned students leading to improved academic achievement in both theory and lab subjects (Annexure B.9.11).

§ Professional Orientation of 2nd Year Students: Conducted for 2nd Year students, so as to orient them professionally to the respective engineering discipline they have enrolled for.

§ Choice of Electives: As the student progresses, guidance and mentoring is done on the choice of electives (Annexure B.9.12).

§ Co-Curricular activities: Mentoring is provided to encourage students on all co-curricular activities, viz, participating in contests, conferences, publications etc.

§ Mentoring for Higher Education: Students planning to pursue higher studies are constantly guided and mentored by respective Depts.

§ Support for Placements: Continuous support is rendered by the Depts in tandem with the efforts of the Corporate and International Relations (CIR) to prepare students achieve dream placements.

· **Course Work Specific**

§ Tutorial Classes: Tutorial sessions are embedded into the curriculum, enabling a direct first level mentoring by respective teaching faculty.

§ Class Committee/ Course Committee Meetings and Follow Up Mentoring Actions: Feedback is taken from the student representatives during the Class Committee meetings on the effectiveness of teaching. Based on this feedback, mentoring and counseling of faculty is done by the Department Chairperson/ Senior professors. Student grievances are also addressed during the Course Committee meetings. The information is escalated to Dean Engineering, if warranted, for his further counseling action.

§ Student Mentors: Students are encouraged to contribute in the academic and personal growth of peers/ juniors by providing assistance as and when required.

Alumni Interaction

Visiting alumni are a great source of inspiration to the student body. They interact with the students, counsel and guide them. This has benefitted especially the motivated students who plan to pursue higher studies (both in India and abroad).

Personal Issues- Counseling & Resolution of Personal Problems: A healthy and peaceful state of mind goes a long way to enable students to concentrate in academics. Counseling students on personal issues is therefore vital, and hence has been incorporated into the system (Figure1). Categories of issues encountered are: interpersonal relationships, behavioral abnormalities, adjustment to the campus environment, emotional disturbances, family related problems etc.

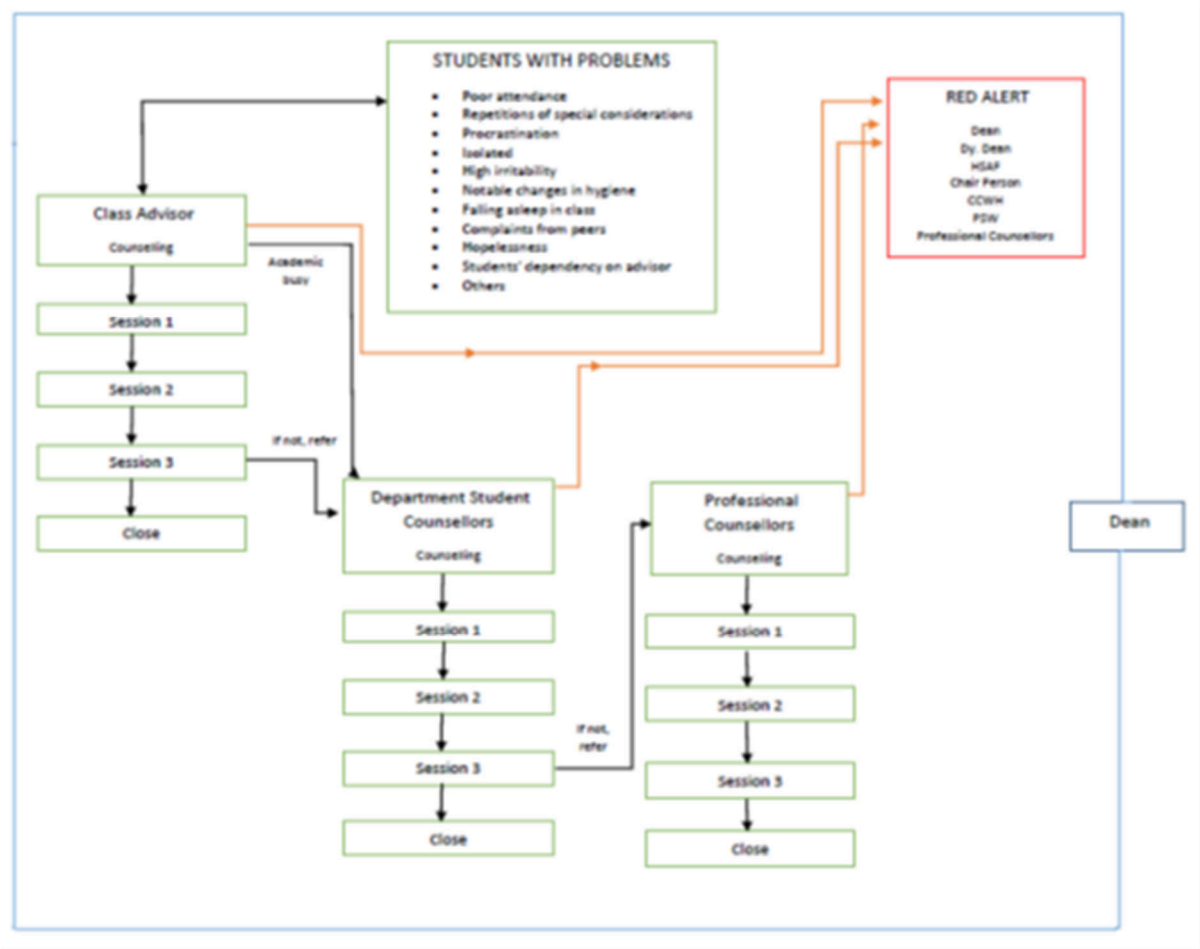


Figure 9.1a- The Counseling Work Flow

The Counseling Structure

Department Faculty Counselors: While the Class Advisors focus primarily on dealing with academic issues, a network of Department Faculty Counselors have been trained and nominated,

to handle behavioral issues beyond the immediate scope of the Class Advisors. The staffing planned is as follows, based on the availability of trained faculty (Annexure B 9.13a):

- Major Departments – 02
- Minor Departments – 01

Professional Counselors: Cases are escalated and referred to the professional counselors when such a necessity is felt by the Departments. They provide individual and group counselling to the students to help them maintain and improve their emotional, intellectual, physical and spiritual well-being through a process of self-discovery that promotes overall well-being. Two Professional Counsellors directly interact with students in need of personal counselling to alleviate stress and anxiety, achieve enhanced self-esteem, attain good inter-personal skills and ultimately help to achieve educational goals. Through the two-tier system of Class Advisors and Department Counsellors, a personal rapport is established with the individual students. Cordial relations are also developed with parents by interacting with them on need basis. For confidential help and exigencies, students are advised to directly contact the help line No.91-9487302905 or email to wecare@cb.amrita.edu (Annexure B 9.13b). A summary of counseling activities carried out by them is given at Annexure B 9.13c. They also carry out training of the Dept Counselors (Annexure B 9.13d)

Chief Faculty Wardens (CFW) and Wardens of Hostels: The CFW and the network of wardens play a crucial role in identifying students needing counseling. All cases needing focused care and attention are referred to the Class Advisors/ Department Counselors

The Work Flow of Counseling Process

- Level-1:(Respective Class Advisors / Teaching faculty/ Hostel Wardens).At the first level, behavioral issues noticed by a warden or a class handlingfaculty, if not addressed by them,are referred to the Class Advisor.
- Level-2: (Department Faculty Counselors / CFW).In case the issue is not resolved by the functionaries mentioned at Level-1, it is escalated.
- Level-3: Professional Counselors. The case is referred to the Professional Counselor, from any level, if warranted.

Wherever required, parents are also invited to render their support and cooperation for effective counseling of their wards. Cases needing psychiatric treatment are referred to premium hospitals in the City. A strategy for counseling and monitoring students, generally followed by Depts are given at Annexure B 9.13e. Minutes of one Counselors Meeting of 27 Jun 2018 is given at Annexure B 9.13f. Follow up action is given at Annexure B 9.13g, Annexure B 9.13h

Student Support Extended for Value Based Education

To follow up on the stated mission of the University, "*to provide value-based education and mould the character of young generation*", varied multi-pronged steps have been initiated to by way of

offering opportunities to students to learn by example. Towards this, a strong foundation is laid for holistic education through Live-in-Labs, Amrita Serve, Amala Bharatham, IAM meditation techniques, Amrita Yoga and Geetamritam (Bhagavat Geeta camp) etc. A special programme is run for the freshers as Amrita Learning to Integrate Values and Excellence (ALIVE) projects in Care to Care, Combating Social evils, Organic Farming, Amala Bharatham (Swatchata drive), Amrita Quench (Conservation of water), Holistic Personality, etc. (Annexure B.9.14)

Efficacy of Mentoring System:

The mentoring-counseling system in place in the School of Engineering has reaped rich dividend in the following ways:-

· A gradual and systematic induction of the students assisted in effective transition to college life, reducing their sense of isolation and homesickness. This gave the students confidence to face the rigors of academics.

· The mentors provide impartial advice, individual and personal care and encouragement to the students all through their academic years. This created a positive work environment and developed a supportive relationship between students and staff. A mixture of harmonious and happy atmosphere prevalent in the campus enable the students to focus on academics and research.

· The placement statistics, success in GRE / GATE/ CAT exams, and admit to premier institutions in India and abroad are testimony to the efficacy of the mentoring and counseling procedure adopted to sustain the academic rigor.

· Enhanced the efficacy of the teaching learning process.

· Increased the comfort level of the students by progressing them through a systematic and structured path to their graduation.

9.2 Feedback analysis and reward/ corrective measures taken, if any

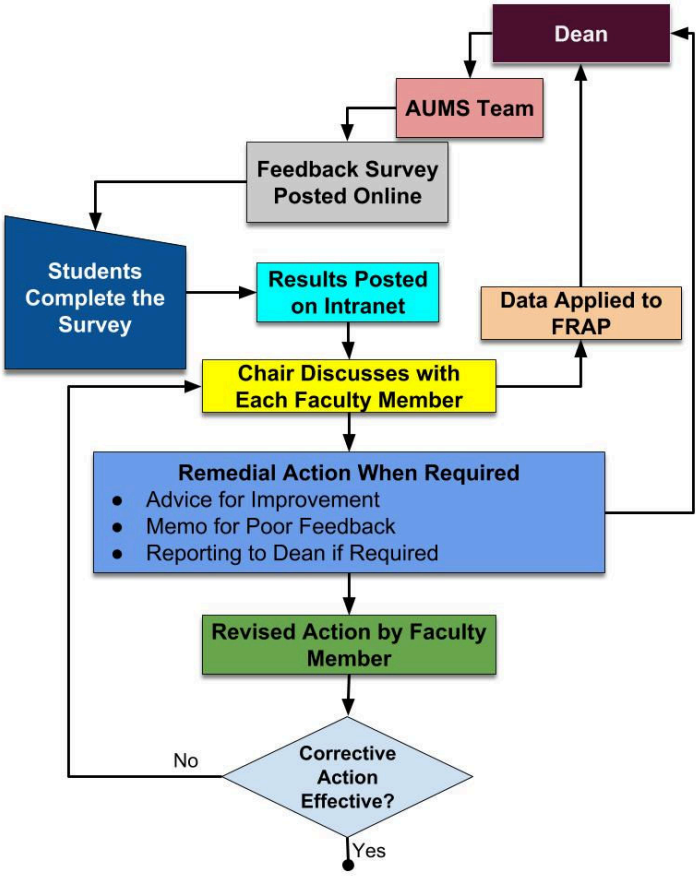


Figure 9.2 Feedback Process

Feedback is collected for all courses and 100% participation of the students is ensured. This is done by on-line teacher evaluation through AUMS. Ability of teaching and comprehensive ability of the teachers will be analysed. All the comments written by the students in feedback forms will be communicated to the respective faculty members along with their feedback levels to know their strengths and weaknesses and to enhance their teaching skills.The evaluation index of all teachers is obtained from the process and appreciations/corrections for individual staff member are given by the Chairperson.

Chairperson/Class advisors visit the classes shortly after the commencement of the semester where the students are given a platform to express their views regarding the subjects, faculty and any other issues they are facing. During this period the Advisor/Chairperson emphasize the importance of each subject, its applications and also about the other activities planning in the semester. According to the student feedback Chairperson will find a solution to their problems, if any, with

the support of Class Advisors. This will ensure a smooth atmosphere for the students in the semester. The faculty in charge of each subject will start the classes with a introduction of the subject with an emphasis on prerequisite, if any, the syllabus, lecture plan, course outcome etc.

After each periodical test a **class committee meeting** is convened in the presence of the Chairperson and the Class Advisor with the representatives of the class. In cases where the performance is very poor more student representatives will attend the meeting. The students' exam performance, their attendance status, class in general etc. is discussed during the meeting. Students are encouraged to present their view points with reference to each subjects. All these points are noted down by the Class Advisor and report to all the faculty. In case if the students find any subject very difficult it will be communicated to the concerned Chairperson.
The faculty feedback matrix is provided in Annexure B 9.2.

9.3. Feedback on facilities (5)

9.3.1 In Amrita hostels, students get ample opportunity to interact with their peers and get enriched both academically and culturally. Utmost importance is given to inculcate values which will help the residents to live in harmony with their friends and equip them to develop an integrated personality which will go a long way in shaping their future. There are nine hostels in the campus. Details of facilities extended are enumerated in the Hostel Handbook (Annexure B.9.15a). The feedback on central facilities is taken on a regular basis from the students, and is incorporated into the system of both academic and counseling structure. A survey taken from Final Year students is shown in Table-1 below. (Annexure B.9.15b).

Table-9.3.1: Exit Feedback 2016-2017 batch

Feedback of Final Year Students (2016-2017 Batch) - Residents - Report							
Total Responses: 1113							
Measure of positivity = positive responses/negative responses = (Very Good + Good) / (Very Bad + Bad)							
Sl no.	Parameters	Very Good	Good	Average	Poor	Very Poor	Positivity

1	Waste Management System	334	515	186	30	49	10.7
2	Drinking Water	294	531	200	40	49	9.2
3	Dining Hall Capacity	240	582	194	40	58	8.3
4	Hostel surroundings (Garden, Hygiene)	304	521	188	49	52	8.0
5	Dining Hall Hygiene	245	534	228	40	67	7.2
6	Visits By Resident Warden	248	529	222	45	70	6.7
7	Mess Hall Infrastructure	207	518	264	57	68	5.8
8	Room Furniture Adequacy	254	468	258	72	62	5.3
9	Hostel Room/Corridor Hygiene	258	471	245	69	71	5.2
10	Toilet Cleanliness	272	461	240	74	67	5.0
11	Accessibility of staff	192	516	261	70	75	4.8
12	Electrical Equipments Availability	239	473	247	84	71	4.5
13	Sports Facilities (Gym, Outdoor, Indoor etc.)	207	471	275	85	76	4.2
14	Laundry Facility	181	454	310	83	86	3.7
15	Behavior Of Hostel Staff	209	470	246	86	103	3.6
16	Reading Room Facilities (News Papers, Magazines etc.)	176	402	345	111	80	3.0
17	Food Serving Mechanism	160	414	306	103	131	2.4
18	Attention On Problems	155	401	273	130	155	1.9

19	Role Of Student Representatives	147	372	298	148	149	1.7
20	Computerized Gate pass Management System (CMS)	177	388	222	117	210	1.7
21	Recreational Facilities	156	279	340	197	142	1.2
22	Quality of Food	110	239	304	173	288	0.8

9.4. Self-Learning (5)

· Facilities to support Self learning

§ Computing Facility: The intranet site- intranet.amrita.edu hosts links to various IT enabled services like Digital Library, Central Library book search etc. The campus is also part of the National Knowledge Network (NKN) of National Mission on Education through Information and Communication Technology (NMEICT) – a project of Ministry of HRD.

§ WiFi at Amrita: All hostels and academic blocks are covered by WiFi.

§ Cisco Networking Academy: Established as one of Regional Academies by CISCO in India in 1998. It is a comprehensive e-learning program. The Academy is currently an Instructor Training Centre (ITC) and Academy Support Center(ASC). The Academy offers certificate like CCNA, CCNP. and ITE.

§ Clubs such as Aero SAE, SAE, Anantam, Shrishti, and respective Department Technical Clubs contribute and complement the self-learning process.

§ Seminars and workshops are organized for the students to enhance their skill. Students are encouraged to attend/ participate in technical events conducted in premium institutions in the country.

§ Students are encouraged to participate in various contests which will help them to learn new technologies.

§ Visits are organized to select industries to provide exposure to students.

§ Students are encouraged to take MOOC courses from platforms such as Coursera and NPTEL.

§ Students participate in programming contests like TGMC (The Great Mind Challenge Contest conducted by IBM), ACM ICPC (programming contest conducted by ACM), and Aspirations (programming contest conducted by Infosys) etc. Participation in these contests provide insight into application development.

§ Students take up competitive examinations like GRE , GATE and CAT.

· Academic Processes promoting Self Learning

§ Certain topics of the syllabus (approximately 5%) are left for self study by the students and evaluated in the End semester examinations. This is seen to motivate students towards self-learning.

§ The questions for the examinations ought not to have been discussed in the class. This encouraged students to explore reference books.

§ The curriculum offers mini project in the 2^{nd}/ 3^{rd} year, which motivates the student to explore problems and challenges beyond the prescribed study material.

§ After their foray into mini projects in the junior classes, the students are exposed to project based courses, thereby encouraging independent thinking. The component of self-learning is evaluated in these courses. This experience is further enhanced during the Final Year student projects.

§ Student are given assignments, (up to 5% weightage) beyond the scope of the syllabus to encourage develop their self-learning capabilities.

§ Encouragement is given for conduct of research in the senior semesters. Students possessing a CGPA above 8.0, and aspiring for a Distinction grade, are required to have a publication in a Scopus Indexed journal.

§ Project Based Learning (PBL): Students are assigned to a design or research project, typically aimed at developing knowledge across several core subject areas (for e.g., a plant design project that brings together aspects of synthesis chemistry, mass & energy balances, thermodynamics, transport phenomena, chemical technology, reactor design, materials science, management, and economics), and work in teams, under a faculty guide's supervision. The specific structure of the

course promotes independent, yet supervised learning, and leadership as well as team work, in solving a problem. The flexibility in learning modes as well as in assessment, provides a strongly encouraging and motivating environment, while yet ensuring academic rigor.

9.5. Career Guidance, Training, Placement (10)

(The institution may specify the facility, its management and its effectiveness for career guidance including counseling for higher studies, campus placement support, industry interaction for training/internship/placement, etc.)

Corporate and Industry Relations

The Directorate of Corporate and Industrial Relation (CIR) is a unique setup, among the educational institutions in India, primarily for the career development of students. Its mission statement clearly set the direction and activities in this endeavour.

CIR's mission

"To facilitate holistic career development of students through comprehensive and systematic training on Life Skills and build competence in core areas through innovative practical applications**"**

CIR's functions are organised under eight units namely, Career Counselling, Career Competency Development, Higher Learning Initiatives, Entrepreneurship Development, Corporate Relations, Placement, Marketing Communication, and Corporate Training. Each of these units works in collaboration with the other units of CIR and also with the various departments of the university. Each of these units has its team in all the campuses with the heads located in the Coimbatore campus.

CIR is well equipped with faculties, staff, infrastructure etc. for its effective functioning. The total strength of CIR stands at 92 with the breakup of 47 in Coimbatore, 23 in Amritapuri, 16 in Bangalore, 5 in Kochi and 1 in Mysore. It has its own independent offices in all the campuses. CIR's infrastructure facilities include Auditoriums, Conference Halls, Interview rooms and Classrooms. The Coimbatore CIR unit has a total floor area of 55,541 sq. ft.

Career Counselling

In Career Counselling students' career aspirations are captured from an early stage, while they are in the campus for their UG or PG programs. Each student is provided with a Career Planning workbook, as early as third semester for B Tech, Arts and Sciences (ASAS) UG, and Integrated MSc/MA programs and first semester for M Tech and Management programs to systematically plan and execute their short-term and long-term goals. It starts with capturing the personal aspirations of students and culminating with goal setting and job acquisition. To guide students in this, each student is assigned to a mentor, who is a CIR faculty.

Career counselling is a process in which a counsellor and counselee(s) are in a dynamic and collaborative relationship, focused on identifying and acting on the counselee's goals, in which the counsellor employs a repertoire of diverse techniques and processes, to help bring about self-understanding, understanding of behavioural options available, and informed decision-making in the counselee, who has the responsibility for his or her own actions.

Career counselling basically consists of four elements:

1. Self-awareness

When individuals are considering career options, it is useful to assist them in attaining greater self-awareness by asking about their aspirations, interests, values, and skills in order that they might better understand which jobs are suited to them and which ones are not a good match.

2. Job market information

Students get job market information primarily through CIR. The Placement unit of CIR has details like job profiles, recruitment process, remuneration etc. of multiple companies from the recruitment processes carried out during previous years. Students interact with the Placement unit and get the details of interest. They also get job details from the CIR faculty whom they interact with for career counseling. Students also get information on job market from social media, company websites, magazines, books and newspapers. They are encouraged to read newspapers to enrich their knowledge on job markets. They attend presentation and talks by companies, which is a good source for job market information.

3. Decision-making/ setting goals

In making a decision about the kind of work to pursue, it is important to integrate self-awareness with job market information to arrive at the best fit for the person. It is often useful to engage in a discussion and weigh the pros and cons of the various choices. Setting both short term and long-term goals is also a useful activity for students to engage in.

4. Job search

Individuals may need assistance with job search strategies such as writing a résumé and cover letter, mastering presentation skills, group discussion skills, interview skills etc.

In the table below, please find the number of students undergone career counselling in the last four academic years.

Table B.9.5a Counselling Activities

Academic Year	Description of counselling Activities	Number of students benefited	Remarks
2014 - 15	One to one counselling	983	Personal File for each student

2015 - 16	One to one counselling	1141	Personal File for each student
2016 - 17	Counselling for poor performers	151	Special training for weak students.
2017 - 18	Career Planning Guide and counselling	1101	Career Planning Guide for each student

Career Competency Development

The Career Competency Development unit has the responsibility of building foundation in students for successful career and making them industry ready as they complete their studies at the institute. Towards this it conducts multiple activities and life skills training is primary among them. CIR is equipped with well qualified and experienced in-house faculties for this training. It researches into emerging industry scenarios and arranges training by industry experts and distinguished academicians in such areas. It conducts training in foreign languages, organises coaching classes for competitive examinations like GRE, CAT, GATE etc. within the campus premises. It conducts mock interview for all the pre-final year students during their sixth semester. It conducts pre-placement training before the commencement of the placement season. It conducts company specific training ahead of the placement process by respective companies.

Life Skills

Life skills defined as “abilities for adaptive and positive behavior that enable individuals to deal effectively with the demands and challenges of everyday life”, include skills and knowledge related to problem solving, critical thinking, communication, interpersonal aspects and self-management. This skill set is one of the essential ingredients for career advancement irrespective of career lines.

The objective of life skills training is to enhance and sharpen the problem solving, communication and interpersonal skills of students. It is intended to support the academic curriculum to fully prepare the job aspirants to be industry ready. Life skills education aims to provide students with strategies to make healthy choices that contribute to a meaningful life. More specifically the following are achieved.

- Introduction to the concepts, development and enhancement of life skills to equip the students to be effective in her/his personal and professional life.

- Enablement for campus to corporate transition by helping students to understand and acquire the knowledge, skills and attitudes which are required for successful transition.

By the end of the life skills training, the student would have a clear life goal and the confidence and strategy to move towards the same. The achievement of this outcome will largely depend on the motivation level and intellectual commitment the student possesses.

Life skills is grouped under three broad categories namely Soft Skill, Verbal Skill and Aptitude Skill. A brief description of each of these is provided below:

Soft Skill

Interpersonal skill plays a crucial role in the career and personal life of an individual. For example, the skill to effectively deal with the various stakeholders in a large program is very much required for the successful completion of that program. In the personal life too, effectively associating with the other members of the family is very crucial for successful personal life. Soft skill courses help the students to develop this skill set through continuous practice in activities like group discussion, presentation, role play etc.

Verbal Skill

The ability to communicate effectively with others is of greater importance to achieve personal and organizational goals. Learning to communicate better is a survival need in this era of technological advancements. Verbal skill courses provide students with ample learning opportunities to improve their ability to communicate effectively. It make them learners for life and also enable them to take up the verbal tests conducted by the recruiters with a lot of confidence.

Aptitude Skill

Aptitude is the ability to learn or to develop proficiency in an area, if provided with appropriate education or training. Aptitude is a component of a competency to do a certain kind of work at a certain level. A test is a systematic procedure for comparing people's performance, knowledge, attitudes, skills, or competence. This course is intended to support students to become familiar and proficient with the latest trends in aptitude testing conducted by companies during their recruitment process.

Course Structure

CIR conducts life skill courses for the undergraduate (UG) and postgraduate (PG) students as part of the academic program in the university. In B Tech the life skill courses are offered over a period of four semesters, while in M Tech the life skill courses are offered over a period of two semesters. In the case of all ASAS UG programs, the life skill courses are offered over a period of three semesters. In all the programs, the life skill courses are structured in such a way that all courses are completed by the end of pre final year before the commencement of the campus placement process. They are credit based courses in almost all the programs.

In the table below, please find the number of students undergone career counselling in the last four academic years.

Table B.9.5b Career Counselling for Students

Academic Year	Course Name	Course code	Number of students Benefited	Remarks
2014 - 15	Life Skills	SSK111	1151	B Tech 3rd, 4th, 5th and 6th semesters
		SSK112	1011	
		SSK113	983	
2015 - 16	Life Skills	SSK111	981	B Tech 3rd, 4th, 5th and 6th semesters
		SSK112	1140	
		SSK113	1141	
2016 - 17	Life Skills	15SSK221	995	B Tech 3rd, 4th, 5th and 6th semesters
		SSK112	988	
		SSK113	982	
2017 - 18	Life Skills	15SSK221	1101	B Tech 3rd, 4th, 5th and 6th semesters
		15SSK321	992	
		15SSK331	994	

Core Competency

In core competency development, the focus is on engineering students. Developing core competency is challenging due to the multiplicity of the disciplines and the dynamic nature of the industry requirements. Our strategy here is to adopt a multi-pronged approach consisting of the following:

- Guest Lectures
- Certification Programs
- Technical Sessions
- Special Classes for Performing Students
- Industry Internship
- Industry Electives

Guest Lectures

CIR organizes guest lectures for the students and faculty in all the engineering disciplines. CIR through its industry contacts identifies experts in various fields of engineering and invites them to the university for interaction with the department faculty and addressing the students. In such programs the visiting experts present industry scenarios, industry problems, challenges and ways to overcome through actual examples from projects. This provides a great opportunity for the students to realistically expand their knowledge, clarify doubts and make plans for developing competency required by industry. This also helps the faculty to understand the industry scenarios and bring-in the industry outlook in their teaching. Guest Lectures are organized throughout the year covering all engineering disciplines.

In the table below, please find the summary of the guest lectures organized during the last four academic years.

Table B.9.5c Guest Lectures

Academic Year	No. of Guest Lectures conducted								
	AEE	CHE	CIE	CSE	ECE	EEE	EIE	MEE	Total
2014 - 15	5	4	4	5	5	4	4	5	36
2015 - 16	4	4	5	4	4	4	3	7	35
2016 - 17	2	3	5	7	5	6	3	9	40
2017 - 18	2	4	2	4	4	4	4	2	26

Certification Programs

CIR facilitates certifications in languages and industry-demand technologies, in the technology area, CIR through their research and with the inputs from industry, identifies certain certification programs. Subsequently through a registration process interested students are identified and CIR conducts training for these students. Through a series of tests, potential students who can clear the certification examination are identified and generally a good percentage of them get certified. CIR makes sure that the certification examinations are conducted by the respective agencies in the campus and well in time.

In the table below, please find the summary of the certification programs conducted during the last four academic years.

Table B.9.5d Certification Programs

Academic Year	Certification Program	Category	Number of students Attended
2014 - 2015	BEC	English Language	5
2015 - 2016	BEC	English Language	4
2016 - 2017	BEC	English Language	17
	NI – CLAD Certification	Technology	15
2017 - 2018	BEC	English Language	42
	NI – CLAD Certification	Technology	61
	Autodesk – Revit Certification	Technology	49

Technical Sessions

CIR conducts technical sessions for the pre final year students of all engineering disciplines in both B Tech and M Tech streams. These are conducted during the sixth / second semester for the B Tech / M Tech students. During this period, CIR conducts classes in programming languages,

In in table below, please find the summary of the technical sessions conducted during the last four academic years for the B. Tech. Students.

Table B.9.5e Technical Sessions for VII Semester Students

Academic Year	Number of Technical Sessions conducted for sixth semester students							
	AEE	CHE	CIE	CSE	ECE	EEE	EIE	MEE
2014 - 15	8	11	12	11	9	10	8	11
2015 - 16	13	12	11	13	12	13	14	12
2016 - 17	11	11	13	11	11	12	12	12
2017 - 18	9	10	11	11	12	11	9	14

Special classes for top performing students

CIR also conducts special sessions for high profile students to prepare them for high profile jobs. Right now, such trainings are conducted for computer science students to build and enhance their skills in problem solving, which is sought by many of the top paying software companies. In this program, CIR organizes special sessions by distinguished academicians and continuous sessions by internal faculties from the department and CIR.

In the table below, please find the summary of the special classes conducted during the last four academic years.

Table B.9.5f Special Classes for Students

Academic Year	Program	Number of hours engaged	Number of students participated	External/Internal trainer
2015 - 16	Problem Solving and Coding Session	30	101	Internal (Dr. Vidhya B / Ardra P S)
	Interactive Sessions on Problem Solving and Algorithms	12	114	External (Prof. Pandu Rangan Chandrasekharan, IIT Madras)
2016 - 17	Problem Solving and Coding Session	12	75	Internal (Dr. Vidhya B / Ardra P S)
	Interactive Sessions on Problem Solving and Algorithms	12	70	External (Prof. Pandu Rangan Chandrasekharan, IIT Madras)
2017 - 18	Problem Solving and Coding Session	25	95	Internal (Dr. Vidhya B / Ardra P S)
	Interactive Sessions on Problem Solving and Algorithms	12		External (Prof. Pandu Rangan Chandrasekharan, IIT Madras)

Industry internship

Industry training is an integral component for core competency building and students typically go for this training during the summer and winter vacations. There are three categories of training

under this namely in-plant training, summer internship and internship as part of the employment offer.

In-plant training is done during the summer vacation following the end of second year and before beginning of third year. CIR supports students in this activity. Internship is organized during the summer vacation following the end of third year and before the beginning of the final year. Students apply for such internship programs with the selection based on academic records, tests, and interviews. Summer vacation internships are for a period of one to one and half months and most of the companies pay stipend during this training program. CIR supports students in this activity.

In internship as part of the placement offer organizations give training, want the students to do project over one or two semesters and evaluate them at the end of the training leading to confirmation of placement. These internships are paid and typically done over a period of one semester for B Tech students and two semesters for M Tech students. Students submit a report at the end of internship program and based on overall performance they are given full time employment.

In the table below, please find the number of students got placement internships during the last four academic years.

Table B.9.5g Students with Internships

Academic Year	No. of Interns
2014 - 2015	117
2015 - 2016	138
2016 - 2017	184
2017 - 2018	187

Foreign Languages

CIR is very proactive when it comes to providing foreign language learning opportunities to students. It has been conducting foreign language classes in three important languages namely: German, Spanish, and French

Since 2003, extra-curricular German language classes are offered to students and young staff-members at Amrita Vishwa Vidyapeetham, Coimbatore, by a German native teacher. The courses (mostly basic A1-level, sometimes also A2-level) last for two semesters and end with an examination through the Goethe-Institut, Chennai, and Coimbatore. Mostly the examiners come to the Coimbatore Campus to conduct the examination. Each academic year almost all students who had registered for the exam, had successfully completed with grades “very good”, “good”, or “satisfactory”.

We have been conducting foreign language training and certification programs in Spanish and French too. In the table below, please find the summary of the German, French and Spanish classes during the last four academic years.

Table B.9.5h Foreign Language Training

Academic Year	Foreign Language	Number of students Attended
2014 - 2015	German	64
	French	28
2015 - 2016	German	43
	Spanish	52
2016 - 2017	German	70
	Spanish	25
2017 - 2018	German	66

Higher Learning Initiatives

CIR facilitates higher learning of students, who plan to pursue MBA, M Tech or MS programs in the country or abroad. A sizeable number of students pursuing the B Tech program in the university have plans to go for management education in well-known institutes in the country and abroad. This primarily requires a good score (percentile) in the qualification examination like CAT, GMAT etc. CIR identifies external institutes who conduct such training programs and selects the best through a process of evaluation, discussions and negotiations.

There are many students from the engineering discipline who have plan to pursue their MS programs in universities abroad or M Tech / ME programs within the country. The students who plan to do their MS in universities abroad, necessarily requires a good score / percentile in GRE and TOEFL for the US universities and IELTS and country specific examination for the European universities. CIR identifies external institute, who can provide a such training and selects the best through evaluation, discussion and negotiation. For the benefit of students who plan to join Indian Public Sector Undertakings or go for engineering post graduate studies with in India, CIR brings in the best institute who can prepare them for GATE.

The selected institutes conduct the training classes in CIR premises during evening hours after the regular classes. These training classes are monitored for the quality of faculty, number of training hours and timing of the classes.

CAT

Amrita students are offered special training for CAT (Common Admission Test). Experts from external training institutes conduct training at CIR premises twice or thrice a week. Approximately 200 hours of rigorous training and several online mock tests containing different levels of questions make the students capable of scoring well in CAT. Scholarship is offered to select students based on the performance in the test conducted.

GRE

CIR facilitates training for GRE aspirants through well-established external institutes. Exhaustive classroom training of 90 hours include areas like quantitative aptitude, verbal aptitude and analytical reasoning, and analytical writing etc. They provide study materials as well as around 25 hours for previous year test paper discussion. Online mock tests are also conducted on a regular basis. The classes are conducted weekly twice or thrice in the evening at CIR premises

GATE

CIR organizes special training for GATE (Graduate Aptitude Test in Engineering) aspirants. Experts from external institutes come to Amrita and provide exclusive training for our students. 350-400 hours of rigorous training includes approximately 250 hours of classroom training on core engineering subjects, engineering mathematics and general aptitude and more than 100 hours of periodic tests. Online tests help the students to analyze their performance and improve their test taking strategy. Students of small batches are formed according to their branch and classes are conducted separately during evening hours at CIR premises.

In the table below, please find the summary of the competitive examination training during the last four academic years.

Table B.9.5i Competitive Examination Training

Academic Year	Competitive Exam training	Number of students attended
2014 - 15	GRE	33
	CAT	51
	GATE	57

2015 - 16	GRE	36
	CAT	57
	GATE	59
2016 - 17	GRE	47
	CAT	41
	GATE	53
2017 - 18	GRE	53
	CAT	51
	GATE	41

Placement specific Interviews and Training

Mock Interviews

CIR conducts mock interviews for all the pre final year B Tech students during the 6th semester. The mock interviews are conducted by a panel consisting of an industry expert and head of the UG team. Students are called as per a schedule and interviews are conducted and feedback is given. The following table lists the mock interviews conducted during the last 4 academic years.

Table B.9.5j Mock Interviews

Academic Year	Students attended Mock Interview Branch wise							
	AEE	CHE	CIE	CSE	ECE	EEE	EIE	MEE
2014 - 15	57	43	53	281	182	115	56	196
2015 - 16	69	60	67	351	199	129	61	207
2016 - 17	56	65	55	291	173	106	59	177
2017 - 18	48	60	63	284	182	108	64	185

Pre Placement Training

CIR conducts pre-placement training for all branches of engineering during the summer vacation between pre-final year and final year with the focus on life skills and technical skills. The pre-placement training is full day program for two to three weeks and typically three hours per day is

allotted for technical training. This training is provided to both B Tech and M Tech students. Technical trainings are conducted by CIR technical faculty, invited industry experts and department faculty.

In the table below, please find the summary of the pre placement training during the last four academic years.

Table B.9.5k Pre-Placement Training Sessions Taken

Academic Year	Average Number of session taken during Pre Placement training
2014 - 15	33
2015 - 16	33
2016 - 17	34
2017 - 18	47

Company Specific Training

In addition to the pre placement training, CIR conducts company specific training one or two days in advance of the placement process by respective companies. In these training an overview of the company, job profiles and previous years' questions are discussed.

In the table below, please find the summary of the pre placement training during the last four academic years.

Table B.9.5l Company-Specific Pre-Placement Training

Academic Year	No. of Trainings
2015 - 16	42
2016 - 17	38
2017 - 18	86

Special Training for Underperforming Students

CIR conducts special sessions for students who are not able to secure a job during the June to Dec period of the recruitment process. The recruitment process generally starts in June and continues till June next year. Such students are identified and given supportive training in their weak areas. Generally, such trainings are in aptitude skill, verbal skill and technical subjects. These trainings are conducted during the winter vacation in between the 7^{th} and 8^{th} semesters. There are cases

where students are given additional coaching,on one to one basis, to face technical and HR interviews.

Corporate Relations

The Corporate Relations unit is the primary nodal point for bringing industry to Amrita. It meets with industries across the country and abroad and presents Amrita's credentials and brings them to the university. It is instrumental in signing Memorandum of Understanding with industry for funded research projects, setting up labs, funded student projects, conducting workshops in emerging technologies, guest lectures, internships, in-plant trainings, faculty development programs etc. It helps to bring in industry experts as part of the committee for curriculum development.

It has the following objectives:

- Build and maintaining good rapport with various industries for the benefit of faculty and students.
- Sign Memoranda of Understanding with major companies, research agencies and institutions to provide opportunities for the faculty and students to work on latest technologies.
- Expose students and faculty to industry practices and developments in technology.
- Facilitate visits by senior industry leaders for interaction with faculty and students.
- Organize guest lectures, seminars and webinars conducted by industry for the benefit of students.
- Secure sponsorships from industry for technical events like conferences, seminars, symposia, workshops and student contests through strategic relationships.
- Setting up labs along with industry
- Mentoring for students by industry leaders for promoting entrepreneurship
- Seek the help of companies to spare working products / prototypes for academic demonstration purposes.
- Facilitate in-plant training, industry visits, summer and final semester internship for students across all disciplines and campuses.
- Undertake consultancy and sponsored research in consonance with the expertise available in the university.
- Promoting Management / Executive Development Programmes
- Soliciting support from reputed companies each year for the Corporate Action Plan with respect to engineering, management, biotechnology and other disciplines.
- Initiate appropriate measures to support Heads of Placement of Engineering, Management and other disciplines so as to improve the quality and range of placements that match the aspiration levels of students and enhance the image of the university.

- Representing / participating in events conducted by industry / other institutions

During the last four academic years it has signed MoUs with industries and the following is a summary list

Table B.9.5m MoUs Signed with Industries

Academic Year	No. of MOUs Signed / Renewed
2014 - 15	18
2015 - 16	9
2016 - 17	6
2017 - 18	14

Industry Electives

CIR facilitates to bring in top in demand industry topics, especially in emerging technologies, to the university curriculum to be offered as elective or core courses. This helps a lot in making the students more in line with the industry by the time they pass out of the university. This is done under the umbrella of the Memorandum of Understanding signed between the industry and the university. When a new course is suggested to be introduced by the industry, CIR gets the curricula reviewed by the department and works with the department in completing all the internal formalities in introducing the course as an elective or as a core. Subsequently the industry trains the faculty through multiple training sessions and the trained faculty in turn teach the students. This has got two benefits of faculty getting trained in latest technologies by industry who in turn teach a large number of students.

In the table below, please find the summary of the industry electives during the last four academic years.

Table B.9.5n Industry Electives

Academic Year	Industry Elective executed	Course Code	Department which offered the Electives	Number of students Completed the course
2014 - 15	IT Essentials	CSE 380	CSE	363
	Business Intelligence	CSE 457	CSE	198
2015 - 16	IT Essentials	CSE 380	CSE	223

	Big Data Analytics	CSE459	CSE	162
2016 - 17	IT Essentials	CSE 380	CSE	324
	Big Data Analytics	CSE459	CSE	106
2017 - 18	Foundations of IT	15CSE377	CSE	227
	Big Data Analytics	CSE459	CSE	285

Placement

The Placement unit does an important role and ensures that all eligible students are placed and continuously strives to raise the bar on the average salary and the highest salary year on year. Along with the Corporate Relations unit, it connects with industries across the country and arranges placement talks and conducts placement process. Year on year, it succeeds in increasing the number of industries visiting Amrita. It is our earnest endeavour to see that the students are placed in jobs as per their career aspiration. Major global corporations regularly visit Amrita to meet its talent requirements. At the end of each placement process, feedback is collected from the officials of the recruiting companies, which is a valuable input to bring in improvements in the career competency development programs.

The stages involved in the placement process is depicted in the diagram below. It consists of 7 stages as described in the diagram

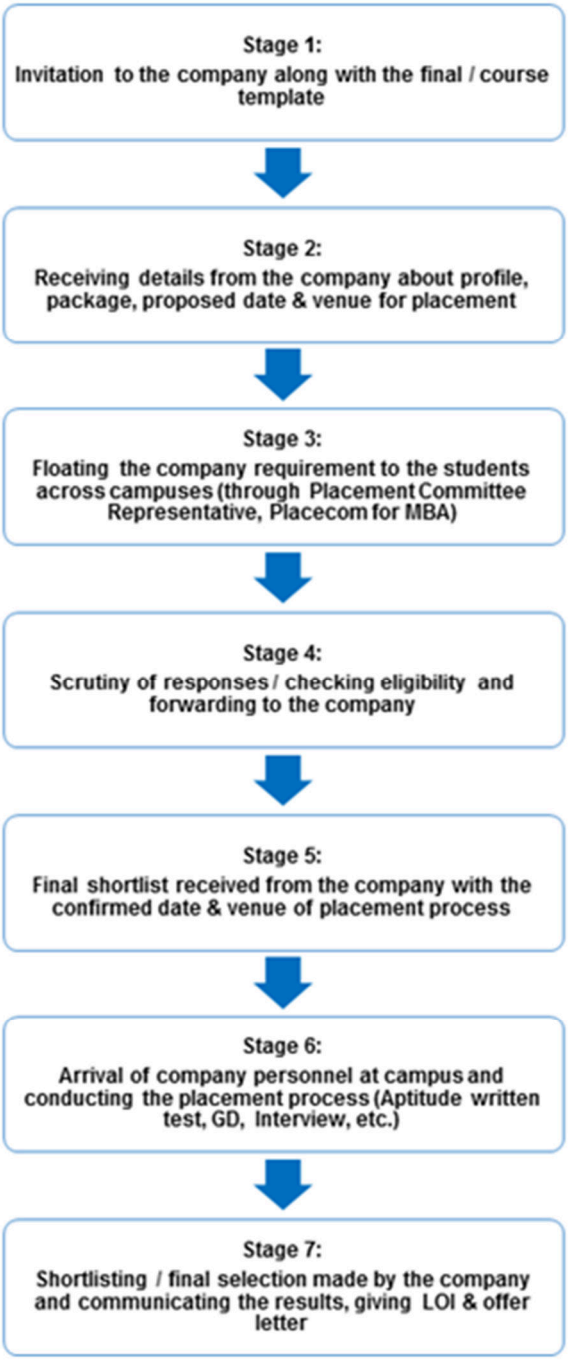


Figure B.9.5a: Stages in Placement Process

The summary of the placement statistics during the last 3 years is shown below

Table B.9.5o Placement Statistics

	2018 Batch			2017 Batch			2016 Batch		
B.Tech.	Regd. Eligible	Placed	%	Regd. Eligible	Placed	%	Regd. Eligible	Placed	%
CSE	**219**	**218**	**99.54**	**275**	**272**	**98.91**	**244**	**237**	**97.13**
ECE	**125**	**123**	**98.40**	**152**	**150**	**98.68**	**152**	**150**	**98.68**
EEE	**58**	**56**	**96.55**	**78**	**74**	**94.87**	**93**	**92**	**98.92**
EIE	**41**	**41**	**100.00**	**41**	**37**	**90.24**	**50**	**49**	**98.00**
Mech.	**82**	**80**	**97.56**	**147**	**131**	**89.12**	**163**	**159**	**97.55**
Chemical	**28**	**19**	**67.86**	**35**	**26**	**74.29**	**38**	**35**	**92.11**
Aerospace	**23**	**20**	**86.96**	**36**	**31**	**86.11**	**43**	**40**	**93.02**
Civil	**16**	**9**	**56.25**	**32**	**30**	**93.75**	**35**	**35**	**100.00**
Total	**592**	**566**	**95.61**	**796**	**751**	**94.35**	**818**	**797**	**97.43**
%	**95.61**			**94.35**			**97.43**		
Average Salary	**4.8**			**4.5**			**4.2**		
No. of companies visited	**108**			**98**			**89**		

9.6. Entrepreneurship Cell (5)

(The institution may describe the facility, its management and its effectiveness in encouraging entrepreneurship and incubation) (Success stories for each of the assessment years are to be mentioned.

Amrita Centre for Entrepreneurship (ACE) - Expanding the Power of Choice

1. THE FACILITY AT ACE:

ACE has its own separate mentoring desk, library, laboratory, and workshop facility.

The mentoring in terms of career options and nurturing startup ideas is provided here. As students get a wide range of courses and programmes to choose from while entering the university, likewise they have a set of choices even before graduating successfully from Amrita. According to Prof. C. Parameswaran, Director - CIR, "The Directorate of Corporate & Industry Relations of the University facilitates students with three options – Placements, Higher Studies and Entrepreneurship".Thus, one of the options for students passing out of Amrita who have the urge to start something is to become an entrepreneur. To nurture the entrepreneurial spirit among youngsters who dare to innovate and initiate, Amrita Centre for Entrepreneurship (ACE) was established by CIR in June, 2011.

The ACE library has its own collection of books and other entrepreneurship-related materials.

There is a laboratory for students interested in building circuits.

A workshop with facilities like lathe machine, drilling and welding equipment is also available.

2. MANAGEMENT OF ACE:

ACE operates with the support of Director, CIR and his office.

Effectively it is a two member team comprising Mr. R. Krishnan (Head) and Mr. D. Sakthivel (Coordinator).

Its activities include:-

- Managing ACE Membership
- Organising entrepreneurship-focused programmes (own as well as funded)
- Mentoring budding entrepreneurs
- Creating and nurturing the entrepreneurship ecosystem

ACE activities draw their direction from the objectives– creating a culture and an ecosystem for infusing entrepreneurial spirit. Its objectives include the following:

· Design, develop and execute high impact entrepreneurship programmes and create opportunities for Amrita students at local and national levels. The programmes would include talks, games and exercises, short courses, events, mentoring, incubation and networking.

· Form student clubs in each campus to promote entrepreneurship.

· Create a powerful 'ACE Community' by bringing in institutional members, hiring / seeking support from faculty, mentors and experts, besides identifying student leaders to form Entrepreneurship Clubs.

· Develop the capacity of ACE to run a mature set of entrepreneurship development programmes within 5 years.The capacity building services covering Consulting, Faculty Development, leadership development, Creation of a pool of volunteers to participate in ACE programmes and setting up E-Clubs.

In the words of Prof. C. Parameswaran, Director-CIR, the ACE charter has as its aim, *"Provide an ecosystem that will kindle, nurture and support the innate desire and ideas lying dormant in the individual and create avenues to fructify those ideas into meaningful enterprises"*.

Thus, the ACE roadmap for entrepreneurship development, which has these stages:

The first stage has been to sensitize and promote entrepreneurship. This included entrepreneurship awareness campaigns using posters, membership drive through induction programmes, conducting seminars, workshops & interactive sessions, idea generation & business plan competitions and calling alumni entrepreneurs to ACE.

The second stage has been to create and foster entrepreneurship. This is done as follows:

· Hands-on work on innovative project ideas;

· Mentorship (by ACE, alumni, other entrepreneurs & CODISSIA);

· Entrepreneurship Awareness Camps (EAC) with EDI, through DST-NIMAT funding;

· EDP with EDI, through DST-NIMAT funding (for alumni in industry); and

· FDP with EDI, through DST-NIMAT funding (for alumni in academia).

The third stage is to nurture entrepreneurship. This is done by providing business incubation facility (like TBI, STEP) and arranging funds (linking corporate funding, investors, angel network, VCs).

The fourth stage is to recognize and celebrate entrepreneurship. This is done by rewarding entrepreneurs (alumni award) and obtaining sponsorship.

The fifth stage is institutionalizing the movement. This happens through the introduction of courses in Entrepreneurship, publication of case studies, provision for incubating, VC funding, etc.

Based on the roadmap, ACE has been progressing in the following manner:

· Conducting programmes with funding from Department of Science & Technology (DST)'s NSTEDB, routed by Entrepreneurship Development Institute of India (EDII), Ahmedabad. On an average, one programme per year, of the following three types:

o 3-day Entrepreneurship Awareness Camps (EACs)

o 2-week Faculty Development Programme (FDP) on Entrepreneurship

o 1-month Entrepreneurship Development Programme (EDP)

· Mentoring inputs along with alumni & associations like CODISSIA, TiE, ICTACT, etc.

· Arranging for certificate courses with the help of external experts

· Conducting competitions - Business Plans, Business Quiz, Best Technical Idea

· Expanding membership base and issuing E-Club membership cards

· Providing library, laboratory and workshop facilities for ACE members

· Organising talks, seminars, workshops etc. regularly and during tech-fest, Anokha

· Conducting club induction programmes for interested freshmen

· Identifying opportunities and working collaboratively with incubators for mature ideas requiring fund support

3. EFFECTIVENESS OF ACE IN ENHANCING ENTREPRENEURSHIP

ACE has achieved the following results till the end of December 2018:

- Obtained a funding of over Rs. 19 lakhs for promoting entrepreneurship
- Acquired a membership base of over 1000 students and alumni
- Successfully conducted 7 Entrepreneurship Awareness Camps (EACs)
- Effectively organised 4 Faculty Development Programmes (FDPs) on Entrepreneurship
- Smoothly executed 3 Entrepreneurship Development Programmes (EDPs) + 1 ongoing
- Has been regularly providing mentoring to budding entrepreneurs
- Constantly provided exposure and motivation to ACE members to follow their passion.

Some of the main reasons for success at ACE include:

- ACE began with 3-day EACs to gain confidence, competence and contacts in the entrepreneurship ecosystem. Once the network was established through the initial 3 years' activities, then moving on to conduct programmes of longer duration like FDP (2-weeks) and EDP (4 weeks).
- ACE has been taking the support of the Director who appreciates the importance of entrepreneurship and encourages students to take this route
- Some of the best entrepreneurs have been coming to ACE to inspire participants
- ACE regularly brings alumni entrepreneurs to the forum to get a better connect
- ACE organises industry visits in EACs for a lasting impact on budding entrepreneurs
- ACE does networking through membership bodies like ICTACT, TiE and CODISSIA
- ACE conducts competitions like the Product Design Award, with cash prizes

4. SUCCESS STORIES FOR EACH OF THE ASSESSMENT YEARS TO BE MENTIONED (PERIOD 2014-2018)

2014-15

Success of ACE Members

· 175 students registered for the Entrepreneurship Awareness Camp (EAC) with funding from NSTEDB, Department of Science & Technology (DST), Govt. of India, routed via EDI India, Ahmedabad.

· In a pilot Certification Programme on Breakthrough Innovation by University of California, Berkeley Extension and Intel partner, FICE, 25 March – 6 May, 2014, out of 27 participating teams from 21 colleges, the top 2 teams selected by Dr. John Danner and Dr. Mark Coopersmith in the Top 10, were from ACE, Amrita.

· Mr. Karthik Srinath, is an alumnus of Amrita Coimbatore, who completed his B.Tech. - Mechanical Engineering, from the batch of 2011-2015. He had been an active member of ACE in the Quadra Cycle Project, where he gained the confidence to do everything. His impressive story is about how he gained in confidence and successfully overcame several challenges through grit and determination, coupled with hard work. Mr. Karthik is the founder of three firms, with a total project cost of the order of 3 crores.: (1) GREEN FIBERS, which is into coir fibre manufacturing, (2) GREEN PITH PRODUCTS, which is into coir pith block manufacturing, and (3) ANNAMALAI ORGANIC FOOD PRODUCTS, which is into oil manufacturing.

· Mr. N. Karthikeyan, is another Amrita alumnus who completed his B.Tech. (Mechanical Engineering) from 2011 - 2015 batch, before enrolling for his MBA (Marketing) at PSG Institute of Management. He is the Founder of Scribble3D, which is into gifting, e-commerce and 3D Printing technology. He has also started Iyal Vanigam, which is into Organic Food retail. He has also partnered with Kodesam to provide a farm experience to students and corporates.

· Mr. Hari Nagendiran, who passed out of ASB in 2014, and the Managing Director of Chocolate Teddies, started promoting his company and taking it to the next level.

<u>2015-16</u>

Success of ACE Members

· 80 students registered for the Entrepreneurship Awareness Camp (EAC) with funding from NSTEDB, Department of Science & Technology (DST), Govt. of India, routed via EDI India, Ahmedabad.

· All 16 participants who attended the FDP on Entrepreneurship, gave positive feedback.

· Out of 27 participants who attended the EDP under EDII-DST-NIMAT Project, 8 started their ventures successfully.

Success stories of EDP participants – Names & Ventures

K. VasanthaKokilam, Candlefire Development Academy, 168, DPF Street, Lakshmi Mills, CBE
Subi Prabhakaran, Cake Dew,Puthuvalil House, Chathannoor, Kollam 691572 Kerala
M S Sooraj Subramanian, Earlang Dreams, 97, Chokalingam Pillai Street, Nataraja Nagar, Madurai
Hariharan S, Nuthukku Muttai, Sri Krishna College, Palakkad Main Rd. Kuniamuthuir, CBE
R. Kumaresu, The Shake Studio, Sri Krishna College, Palakkad Main Rd., Kuniamuthuir, CBE
P.Amuthan, Amuthan Trading,29A,Durai Samy Layout, Peelamedu, CBE
Alagappan Manickam, ALST & Co.,RangaKonar St, Anupperpalayam, Ram Nagar, CBE
Anil Subahar, Shape recruiters, No.19, Malaya St., Vasantham Nagar, Kovaipudur Pirivu, CBE

2016-17

Success of ACE Members

· 75 students registered for the Entrepreneurship Awareness Camp (EAC) with funding from NSTEDB, Department of Science & Technology (DST), Govt. of India, routed via EDI India, Ahmedabad.

· ACE Product Design Award Contest was conducted on 14th October, 2016 and the results were declared on 24th October, 2016 and the prize winners were awarded cash prizes as per the details given below:

o 1st Prize : Ikram Shah V., S. P. Harish & Guru Prasath: Agriculture-related solution to clear wild plants grown in fields,

o 2nd Prize : Anudeep K., Nandika V., Meghavarshini V., Ganesh V. & Abhijith Vivek: Making a cost effective and energy efficient solar cooker

o 3rd Prize : P. Santhosh: Automation of water pump using Microcontroller: household & industrial use

· Four students from ECE Department of Amrita School of Engineering, three of whom were ACE members, had secured Runner-Up position in the Bosch Makeathon. The event had happened on 18th, 19th and 20th November, 2016 at Nasscom 10000 Startups, Bangalore. The team members are: Ikram Shah V, Karthikeyan S., Subhash Chandran S. and Adithya Bharadwaj U.

· All 20 participants who attended the FDP on Entrepreneurship, gave positive feedback.

· Out of 25 participants who attended the EDP under EDII-DST-NIMAT Project, 7 started their ventures successfully.

Success stories of EDP participants – Names & Ventures

Mr. Prasanna Balaji, Coral Textiles, 293/1A, Mullai Nagar, Iduvampalayam road, Periyandipalayam, Tirupur
Mr. Sushil Sivanesh E, Impresso Gifts as a new venture under Impresso 3D, MIG B 190, Brindhavan Nagar 3rd Cross, SITRA, Coimbatore, Poonga Nagar, Civil Aerodrome Post, Peelamedu, CBE
Mr. Surya Narayanan.P, Sportico40 Sakthi Green Land, Thiruvalluvar Street, VellakinarPirivu, GN Mills (PO), CBE
Mr. Sathish Kumar.P, SKV Paper Product, Lalithaammal Thottam, Vellamadai PO, Kalipalayam, CBE
Mr. Rajan R, Chellam Canteen, 126,ponnaiya Rajapuram 4th street, CBE
Mr. K.S. Mohan Kumar, Latlon Technologies Pvt. Ltd, Kathir IT Park, Neelambur, CBE

Mr. M. Thirunavukrasu, Agri fly, Iswaraya Apartment, Veeranam Road, Kelampakkam, Chennai

2017-18

Success of ACE Members

· 82 students registered for the Entrepreneurship Awareness Camp (EAC) with funding from NSTEDB, Department of Science & Technology (DST), Govt. of India, routed via EDI India, Ahmedabad.

· Abhijeet Singh, CEO, BookBecho.com, won the award for Best Business Idea and also for bagged the Second Prize as Student Innovator in the Regional Startup Activation Program (RSAP 2017) conducted by Forge Accelerator along with Entrepreneurship Development & Innovation Institute - Tamil Nadu (EDII-TN). S. Karthikeyan's start-up idea was selected in the top 24 and also announced as a special mention by RSAP. The students were felicitated on 26 April, 2017.

· ACE member, Ms. Vamanie Perumal, was awarded the Suyasakthi Viruthugal, Homepreneur Awards – category of Education and Literature, the one of a kind initiative by Brand Avatar to acknowledge women entrepreneurs who make societal impact. The event was telecasted on News 7 Tamil channel on Independence Day 2017.

· ACE members, Ikram Shah and Vamanie Perumal were successful in making it to the NEXT 12 'Ideas WORTH PROTOTYPING' selected by EDII-TN & FORGE. They were awarded a cash prize of Rs. 25,000 each as a recognition of their efforts and to help them meet the expenses of furthering the outcomes in creating prototypes for their solutions. The jury hunted down Top 18 Ideas from among the 700 innovative ideas provided by the students of Tamil Nadu. After subsequent rounds of mentoring, screening, and competitive selection, the Top 36 ideas were shortlisted for the 3-day residential BootCamp at FORGE.FACTORY. After rigorous process of selection the Top 18 ideas pitched to a jury of top experts, investors, and entrepreneurs on the Demo Day (4th day) organised on the 3rd December, 2017.

· In the Innovative Project Contest 2K18, organized for generating novel product-development / service-related ideas through student presentations made at two-levels. Totally 18 teams (20 Projects) applied in the first level presentation on 16th March, 2018. Top three projects were

selected based on uniqueness of the project, technical details, market potential & profitability, fund position and timeline & resources to build and demonstrate a working model.The 3 winning projects were:

- 1st Prize (Rs. 5000/=): Reclined Electric Berth by Anumantharaja V & Team
- 2nd Prize (Rs. 3000/=): Beans Dehuller Machine by Shivaguru Prakash G & Team
- 3rd Prize (Rs. 2000/=): Solar Desalination by Akhilesh Ravindran & Team

The other 6 teams at 2nd level received consolation prizes (Rs. 500/= each)

· All 21 participants who attended the FDP on Entrepreneurship, gave positive feedback.

· Out of 26 participants who attended the EDP under EDII-DST-NIMAT Project, 9 started their ventures successfully.

Success stories of EDP participants – Names & Ventures

Dr. Indumathy R., RGPAL GLOBAL, 65, Thaneerthotti Veedi, Mugasimangalam, Alandurai Post, CBE
Mr. Amarnath B., SPETIX ENTERPRISES AND SERVICE PVT LTD, Kadavnthra, Kochi
Mr. Siva Kumar. M, Cyber Star Exports and Imports, VJ Nagar 2nd Street, Kottaipalayam, CBE
Mr. Vignesh M.. Sri Vignesh Enterprises, 3/160,Kaveri Tank Street, Theethipalayam, CBE
Mr. Menon Vishnu Janardhan, Garpenter, Avinashi, CBE
Mr. Satheeshkumar S., Satheesh Industrials, 14/18b-1, P.N. Lay Out, Vedapatti, CBE
Mr. C M Sathyaprakash, Yakshini Eco Garments, 302,D Block, Tulips Apartment,Nava India Signal, CBE
Mr. Vignesh Prasanna, The Rapidgo Logistics, 1/447 H.5, Near Neelambur Tollgate, Chinniampalayam, CBE

Mr. Harsha Mukund Soundararajan, Microskin India Pvt Ltd, Kk *Pudur, CBE

OVERALL, 2014-18

· EACs: 661 participants have benefited from 7 EACs. More and more students are now aware of and exercising their choice of the third option – entrepreneurship.

· FDPs: 57 participants have so far benefitted from the 4 FDPs organized under the EDI-DST-NIMAT scheme. Several participating colleges like JCT College of Engineering, Sankara College of Science & Commerce, Sri Krishna College, IIVM, Annapoorna Engineering College and Selvam Engineering College, have started conducting their own programmes through EDI-DST-NIMAT funding based on our inputs, contacts and guidance.

· EDPs: 78 participants have benefitted from the 3 EDPs conducted by ACE so far. This includes some student alumni as well. About 30% (24 numbers) of the EDP participants have started their ventures after successfully attending our programme.

9.7 Co-curricular and Extra-curricular Activities

Students are engaged in co-curricular and extracurricular activities and field trips through student chapters and forums, which provide opportunities for students to explore new fields of interest, cultivate leadership skills, and learn teamwork. While the co-curricular activities are held under the aegis of the respective departments, the extra-curricular activities and sports are organized by the Office of Students Welfare and Department of Sports respectively. Every department has its own association through which various department symposia, workshops and other technical and non-technical events are conducted. Students are encouraged to compete in state and national level sports and cultural competitions. Several festivals and events are organized drawing inspiration from our rich Indian culture. A Talent Search Program is organized for the freshmen (Annexure 16a). An annual cultural festival Amritotsavam is organized to showcase the talents of students (Annexure 16b). Several music and dance programs are organized by inviting renowned artists

through SPIC MACAY. Student representatives are elected for conduct of the cultural and sports activities. All the students of ASE are divided into four Houses

In order to promote healthy competitions in Sports and Cultural events. Student Secretaries/ Jt. Secretaries and Captains / Vice Captains (for cultural events and sports respectively) are elected for each House every year through a democratic process (Annexure 16c and d).

The following students have presented /published research articles in various national /international conferences/journals during the Academic year 2015-2016, 2016-2017, 2017-2018

Table B.9.7 Student Publications

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2015-2016	International Conference on Advanced Materials,SCICON'16, Coimbatore,19-21 December 2016,Organized by Department of Sciences,Amrita Vishwa Vidyapeetham,Coimbatore	Influence of multiscale fillers on the mechanical, transport and rheological properties of Polypropylene	Malavika D,Aparna R,Deepak T,Haritha P S	Best Paper Award,Conference Proceedings published by:BONFRING Intellectual Integrity

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2015-2016	International Conference on Macromolecules: Synthesis, Morphology, Processing, Structure, properties and Applications ICM 201613th – 15th May 2016 Organized by International Unit on Macromolecular Science and Engineering (IUMSE), Mahatma Gandhi University, Kottayam, Kerala, India Conference Venue: School of Chemical Sciences, Mahatma Gandhi University, Kottayam ,	Simulation studies on Electric field propagation in cross-linked Polyethylene Nanosilica Composites	Anjana Suresh, Karthika Pattath, Asseb C. Mohammed	Proceedings Published By: Apple Academic Press
2015-16	AIChE Annual Meeting 2015, Salt Lake City, Utah, USA, November 2015	Modeling of Drying Stage in a Bubbling Fluidized Bed Coal Gasifier	Karthik Chidambaram, Rameshwar Vedachalam, Swati Achra	Proceedings Published by American Institute of Chemical Engineers (AIChE)
2016-2017	Published a paper in the International Journal of Vinyl and Additive Technology, Jan 2019, doi:10.1002/vnl.21696 Wiley Publications	Mechanical and Thermal properties modelling,sorption characteristics of multiscale(Multiwalled carbon nanotubes/glass fiber)filler reinforced	Pavithra Ramakrishnan,Ganesan R Nandhini,Ramya Paneerselvam,Veeraraghavan A V	Wiley Publications Impact factor: 1.2

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
		Polypropylene composites		
2016-2017	International Conference on Advances in Materials and Manufacturing Applications,ICONAMMA 2017,17th-19th August 2017, Organized by the Department of Mechanical Engineering,Amrita Vishwa Vidyapeetham,Bangalore	Effect of compatibilizer and carbon nanotubes on blends of Polypropylene and Nylon '6	Anjali Suresh,Aishwarya Lakshmi S,Neeraja Sethuraman,Ashwin Vinod	Conference Proceedings published
2016-2017	International Conference on Advances in Materials and Manufacturing Applications,ICONAMMA 2017,17th-19th August 2017, Organized by the Department of Mechanical Engineering,Amrita Vishwa Vidyapeetham,Bangalore	Cure and Degradation Kinetics of Sulfur Cured Nanocomposites of EPDM-NBR Rubber Blends	Sanha Kaizer Tajamul Basha, Divya R, Ashwini U Menon	Conference Proceedings published

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2015-2016	International Conference on Macromolecules: Synthesis, Morphology, Processing, Structure, properties and Applications ICM 2016 organized by International Unit on Macromolecular Science and Engineering (IUMSE), Mahatma Gandhi University, Kottayam, Kerala, India held at School of Chemical Sciences, Mahatma Gandhi University, Kottayam, pp 27, 13th – 15th May 2016	Simulation studies on Electric field propagation in cross-linked Polyethylene Nanosilica Composites	Anjana Suresh, Karthika Pattath, Asseb C. Mohammed	Conference Proceedings published
2015-2016	International Conference on Recent Advances in Nano Science and Technology 2015 (RAINSAT-2015) organized by Sathyabama University in association with CSIR – Central Leather Research Institute at Sathyabama University, Chennai, pp 54, 8th – 10th July 2015	Simulation of electric field distribution in nanodielectrics based on XLPE	Arjun Jayakrishnan, Kavitha D, Arthi A, Niveditha Nagarajan	Conference Proceedings published
2016-2017	AIChE Annual Meeting 2016, San Francisco, California, USA, November 2016	Modeling of Fischer-Tropsch Synthesis in Microchannel Reactor	Arun Meyappan Venkatachalam, Sri Nithya Rupine Anbarasu	Proceedings Published by American Institute of Chemical Engineers (AIChE)

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
2017-2018	International Conference on Advance Materials for Technological Applications (ICAM-18) organized by PSGR Krishnammal College for Women, Coimbatore ,January 3-5, 2018.	Drug Encapsulated Grafted Copolymer for Sustained Release of Nitrendipine – Preliminary Study	Durgasree R, Geeva prasanth A, Sai shruthi B, Sathish kumar A, Sindhu S	Conference Proceedings published
2017-2018	International conference on Advances in Science and Technology(ICAST-18) organized by Swami Keshvanand Institute of Technology, Management & Gramothan,Jaipur,May 4-5,2018.	Preparation and Characterizatio n of Nitrendipine loaded Arylamide Grafted Chitosan blend Microspheres: in vitro drug release studies	Geeva Prasanth A, Sathish Kumar A,Sai Shruthi B,Sindhu S	Conference Proceedings published
2017-2018	International conference on nanotechnology:ideas, innovations & initiatives-2017, IIT Roorkee, Roorkee, India	Highly Crystalline BaTiO3 Nanoparticles/ TiO2 Nanorod Composites for DSSC Photoanode Applications	S. Lakshmi, M. Keerthana, R. Namitha, K. Gopika, G. Baiju, B. Murali	conference proceedings published
2017-2018	9th International Conference on Materials for Advanced Technologies (ICMAT 2017), Singapore.	Solution Processed Bismuth Sulphide (Bi2S3) and Bismuth Sulphide Based Ternary Photoactive Materials for	Arjun Moorthy	conference proceedings published

Paper Presentation in Conferences/Technical Seminars by students				
Academic Year	**Name of Conference, Place, Year**	**Paper Title**	**Name of student**	**Rank**
		Solar Energy Harvesting		
2017-2018	AIChE Annual Meeting 2017, Minneapolis, USA, October -November, 2017	Modeling of Particle Breakage and Dispersion in a Slurry Fischer-Tropsch Reactor	Deekshitha Adapa and Aruna C.M.	Proceedings Published by American Institute of Chemical Engineers (AIChE)
2017-2018	AIChE Annual Meeting 2018, Minneapolis, USA, October-November, 2018	Fischer-Tropsch Synthesis over Alumina Supported Cobalt Catalyst in a Fixed-bed Reactor	Adithyahari Badrinarayanan, Mohammed Muzwar, Pushkala Venkatesh	Proceedings Published by American Institute of Chemical Engineers (AIChE)
2017-2018	International Conference on Advances in Materials and Manufacturing Applications,ICONAMMA 2017,17th-19th August 2017, Organized by the Department of Mechanical Engineering,Amrita Vishwa Vidyapeetham,Bangalore	Effect of Compatibilizer and Carbon Nanotubes on Blends of Polypropylene and Nylon 6	Anjali Suresh,Aishwarya Lakshmi S,Neeraja Sethuraman,Ashwin Vinod	Conference Proceedings published

9.7.1 Co-Curricular Activities

The Co-curricular activities of the Chemical Engineering department are conducted by two different chapters namely, a) Federation of Indian Petroleum Industry (FIPI) b) Indian Institute of Chemical Engineers (IIChE). These two student chapters conduct guest lectures, Techathons, Chem-E-Car event, quizzes and etc.,. IIChE works on broad range of activities that are related to Indian Chemical and process industries, whereas the FIPI focusses activities related to Petroleum Industry.

The FIPI secretariat also organizes annual conclave of student chapters hosted by any one of the 13 student FIPI Chapters in India. During this annual conclave a topic will be given to the FIPI chapters, where in they need to present the data that they collected and analyzed. Such type of conclaves where in students will work for more than a month to collect the data and analyze will improve their learning skills. These annual conclaves provide a platform to discuss and interact with other student peers in India and know the status of the petroleum industry. Further, every chapter is asked to present their activities that were carried out by them during the year. This year around activities related to the curriculum shall help student learn.

The Chem-E-Car introduced by IIChE Student Chapter is design a price reaction and reactor system to travel a specified distance. The use of batteries is not allowed for the main drive system. The main drive needs to be powered by a reaction. The students will learn how to control a reaction precisely.

Table B.9.7.1a Workshop/Seminars/Guest lectures conducted by the Department of Chemical Engineering

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity
2016-2017	IIChe	Guest lecture	Shri.Susil Kumar,Formerly President,Dahej Petrochemical division,Reliance Industries Limited and later President,GMS,Reliance Industries Ltd,Mumbai,delivered a talk on Water Conservation on 17th February 2017,
2016-2017	IIChe	Hands on Workshop	National level hands on Workshop on Nanomaterials and Nanotechnology(30th January 2017-4th February 2017) organized by Department of Chemical Engineering and

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity
			Materials Science
2016-2017	IIChe	Guest lecture	National Seminar on Design of Curriculum for Sustainable and Societal Development at Amrita Vishwa Vidyapeetham,12th August 2016,Coimbatore Campus
2016-2017	IIChe	Guest lecture	Dr.S Sakthivel ,Team Leader,Centre for Solar Energy Materials,International Advanced Research Centre for Powder Metallurgy and New Materials,Balapur PO, Hyderabad delivered a talk on "Important role of functional materials and coatings for concentrated solar thermal power (CSP) and amp:PV applications on 26th October 2016
2015-2016	IIChe	Guest lecture	Guest lecture by Dr.R.V Subba Rao,Superintendent,Laboratory operations,Reprocessing Plant Operations Division,Reprocessing Group,IGCAR,Kalpakkam on Chemical Engineering Technologies for nuclear fuel cycle on 22nd March 2016
2015-2016	IIChe	Guest lecture	Dr.Joseph Smith of Missouri Institute of Science and Technology delivered an invited talk to students of Chemical Engineering on 6th August 2015
PETROTECH SOCIETY			
Academic year	**Name of the chapter/Society**	**Name of the activity**	**Detail description of activity**
2017-18	FIPI / Petrotech	Hands on Workshop on Process Simulation	As part of ANOKHA, a 3 day hands-on workshop was conducted by the FIPI Student Chapter of Amrita Vishwa Vidyapeetham during 22-24th February, Nearly 25 students from other colleges had participated in the workshop. The Resource person was Dr. Udaya Bhaskar Reddy Ragula, Associate Professor, Department of Chemical Engineering and Materials Science.

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity
ISAMPE			
Academic year	**Name of the chapter/Society**	**Name of the activity**	**Detail description of activity**

2012-'13	Indian Society for the Advancement of Materials and Process Engineering (ISAMPE)-Coimbatore Chapter	INCCOM-11 (National Conference on Composites)	The Eleventh ISAMPE National Conference on Composites was conducted at Amrita Vishwa Vidyapeetham, Coimbatore during November 2 and 3, 2012.The conference was inaugurated by the Chief Guest Dr. J . Narayana Das ,Chief Controller (R&D) and Outstanding Scientist, DRDO. Dr.M.P.Chandrasekharan, Dean-Engineering, Amrita Vishwa Vidyapeetham presided over the function. Prof.R.Subba Rao,Chairman- Organizing Committee INCCOM 11 welcomed the gathering.Dr. K. Vijayaraju, President ISAMPE gave the felicitation speech. Shri M K Sridhar, Adviser (M&A) and Head – Materials Science Division, National Aerospace Laboratories gave the Keynote Lecture on Development of Carbon Fibres from PAN indigenously. Dr.K.Jayanarayanan, Convener-INCCOM 11 proposed the vote of thanks.The inaugural session was graced by Dr. R V Krishnan, Dr. Sankaran, Shri TM Naidu former Presidents of ISAMPE and the invited speakers viz. Prof. B. Dattaguru (IISc,Bangalore), Dr.RMVGK Rao, Shri M Subba Rao (TAML,Bangalore), Dr. Packirisamy (VSSC),Prof. Sabu Thomas (Mahatma Gandhi University), Prof. Kuruvilla Joseph (IIST-Thiruvananthapuram), Prof. R. Velmurugan (IIT-M), Dr. CM Manjunath (NAL,Bangalore), Dr Pavankumar (NAL,Bangalore)r, Dr. Bhaskar Patham (General Motors, Bangalore) and Shri A Rajarajan (VSSC).Over 90 delegates registered for the conference. A total of 11 invited talks and 40 contributory papers were presented. A cultural programme was arranged in the evening of the first day of the conference followed by dinner. A Panel discussion was conducted during the valedictory function, the topic being “Carbon fibre and Carbon Nanotubes composites for the next decade”, Dr.RMVGK Rao, Shr.M.Subba Rao, Dr. Packirisamy, Dr. Pavankumar were the panel members. Prof. R. Subba Rao moderated the discussion.

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity
2016-'17	Indian Society for the Advancement of Materials and Process Engineering (ISAMPE)-Coimbatore Chapter	Support for workshop	ISAMPE Coimbatore Chapteport to the Nathop On Nanomaterials and Nantes held from 30th January 2017 to 4th February 2017 0rganized by Centre of Excellence in Advanced Materials & Green Technologies, Department of Chemical Engineering and Department of Electrical and Electronics Engineering, Amrita School of Engineering, Coimbatore. . The following ISAMPE members were resource persons for the workshop and they delivered lectures in their area of expertise.1. Prof. Sriram Devanathan 2. Dr. K. Jayanarayanan 3. Dr. Meera Balachandran 4. Dr, Murali Rangarajan 5. Dr. Nikhil Kothurkar 6. Dr. Duraisamy Kumaresan
2017-18	ISAMPE	Guest lecture by Dr. K. Kalyanasundaram	A guest lecture was delivered on"Recent developments in third generation photovoltaics"
Conferences/Seminars/Workshops organized by the department			
Academic year	**Name of conference/ seminar/workshop**	**Name of the activity**	**Detail description of activity**
2016-2017	National Conference on Curriculum Design for Sustainable and Societal Developme		12-13 August 2017

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity
	nt		
2016-2017	High profile panel discussion organized by MA Math & Amrita Vishwa Vidyapeetham "Making Sustainability a Reality: from Policy to Successful Practice", 25th September 2016		
2016-2017	National Level Hands-on Workshop on Nanomaterials and Nanocomposites		Hands-on Workshop on Nanomaterials and Nanocomposites from January 30th – February 4th, 2017
2016-2017	Two – day "IANCAS – Radioactivity workshop"		Workshop with hands-on components conducted by research scientists at IGCAR for UG and PG level students 2-3 March 2017 at ANOKHA 2017
2017-2018	Two day tutorial workshop	Resource person: Dr. K. Kalyanasundara	11-12th September 2017

Academic year	Name of the chapter/Society	Name of the activity	Detail description of activity
	on Photovoltaic Solar Energy Harvesting Applications	m, EPFL Switzerland	
2014-2015	One day Hands on training cum tutorial workshop on Solar Photovoltaic Energy Conversion and Storage Applications	Resource person: Dr. K. Kalyanasundaram, EPFL Switzerland	30th September 2014

The following students have participated/ secured prizes in the competitions conducted by student chapters/conferences/seminars/technical events/workshops/live in lab projects/Online certification courses/ students eligible for scholarships/ Awards received for Academic performance

Table B.9.7.1b Participation/ Prizes in Competitions

Name of the student	Month/Year	Details of award/recognition/grants received
Alluri Sharanya	2018	Selected for the 2nd level Chhatra Viswakarma Award 2018 Participated in FIPI Research Conclave and presented a technical paper Selected to FIPI Petrotech Youth Forum 2019 and secured Ist prize
A Lakshmi Yashodhara	2018	Selected for second level of Chhatra Viswakarma Award 2018 Participated in FIPI Research Conclave and presented a paper Attended FIPI Petrotech Youth forum 2019 Won third place for the project in entrepreneurship club
R.Balasubramaniyan	Jan 2018	Participated in AICHE conference

Name of the student	Month/Year	Details of award/recognition/grants received
Hariharaan R K	2018 2018 2018	Participated in SITRA conference on "Energy efficiency for a sustainable future Selected to regionals of Chaatra Viswakarma Award 2018 Won first prize in "Research Conclave" in Anokha 2018, Coimbatore Participated in AICHE conference and Jeopardy event
Malavika Reghunathan	2017 2017	Participated in IIT Madras Model United Nations Conference ,2017 Participant in SITRA conference: Energy efficiency for a sustainable future,2018
A R Nagarajan	2018	Attended AICHE conference in VIT Participated in Jeopardy event (AICHE) at VIT

Name of the student	Month/Year	Details of award/recognition/grants received
Nirenjan Shenoy P N	2018	Selected to regionals of AICTE Chhatra Viswakarma Award 2018 Participated in AICHE conference
Prateeka Haldori	2017	Won 3rd place for the project presented in Entrepreneurship club
K Ravishankar	2018	Attended AICHE conference
N R Sai Maadesh	2018	Participated in FIPI Petrotech Youth conference held in Dehradun
Santhoshi R B	2018	Participated in SITRA conference "Energy efficiency for a sustainable future",Coimbatore

Name of the student	Month/Year	Details of award/recognition/grants received
S Shivanesh	2018	Presented a paper in Scientium 2K18 (Symposium in Kongu Engineering College)
Sivaprabitha S	2017-2018	Receiving Prime Ministers Scholarship scheme 25000/Annum
G.S.K Srinivas	2018	Participated in SITRA International Conference: Energy efficiency for a sustainable future Attended AICHE organized event Jeopardy

Name of the student	Month/Year	Details of award/recognition/grants received
J Vaishnavi Sree	2018	Presented a paper in Scientium 2K18 (Symposium in Kongu Engineering College,Erode,Coimbatore) Presented a paper in International conference on "Mathematical Modelling and Simulation",
P Vishnu Pratap	2018 Sep 2018	Participated in AICHE convention at VIT university and in Cheme Jeopardy Participated in FIPI Petrotech Youth Forum held at Dehradun
Yashwant S	Dec 2018	Won the Ist prize for the quiz at SITRA Textile conference
Name of the student	**Month/Year**	**Details of award/recognition/grants received**
Aarthy G		Participated in Workshop organized by IGCAR, Anokha 2017

Name of the student	Month/Year	Details of award/recognition/grants received
Abijeeth	2016 onwards	Receiving Amrita Vidyanidhi Scheme Scholarship-25% refund of fees Participated in Workshop organized by IGCAR, Anokha 2017
Aishwarya Babu	Dec 2018 May 2018	Participated in SITRA conference on energy conservation for sustainable future, Coimbatore BEC Cambridge examination(C1 level),Amrita, Coimbatore
Anathapadmanabhan	2018 2017	Participated in Model United Nations-IIMMUN 2K17 ,PSG MUN Participated in Workshop organized by IGCAR, Anokha 2017
Ashuthosh Pandey	2016-2017	Awarded as the class topper in 1st year b.tech chemical engineering the academic year 2016-2017.

Name of the student	Month/Year	Details of award/recognition/grants received
Balaji P	2017 2018 2018	Participated in Workshop organized by IGCAR, Anokha 2017 Aspen Hysys course in coursera Basics of Petroleum Engineering by Duke University in Coursera
Deepak Suresh Varma	2017 2018 2017-2018 2017	Model United Nations :IITMUN 2017 Business English Certificate (B2) completed Live in Labs Project at Jharkhand:System design for Integrating technologies for building water- wise communities Participated –in Atomic Chemistry workshop 2017 Anokha
Harikrishnan P	2018	Attended the SITRA conference on Energy conservation, Coimbatore
Jeganath R	 2018	Attended radioactivity workshop organized by IGCAR, ANOKHA 2018, Amrita Vishwa Vidyapeetham

Name of the student	Month/Year	Details of award/recognition/grants received
Kabilesh R	2018	Technical event Techathon Winner ,2018
Kamalesh K	2018	Techathon Winner, Anokha 2018
Nikhil Ramdoss	2018	Attended FIPI Conclave, UPES, Dehradun, Presentation topic: Future of oil in transport in India
S Prashanth	2018 2018 2017 2018 2018 Sept 2018 2018	German Language,A1 certification German Language,A2 certification Attended Anokha Workshop on Radioactivity by IGCAR Techathon Anokha Winner Treasure hunt by Cyber security-Anokha, Runnerup FIPI –Best student chapter participation FIPI –Youth forum-Member-Conference

Name of the student	Month/Year	Details of award/recognition/grants received
		Amrita Center for Entrepreneurship – Innovative project contest Finalist
Rashmi N	Sep 2018 2018	Conference:FIPI Conclave,UPES,Dehradun,Presentation on Future of oil in transportation in India Participated in SITRA conference Dec 2018 on energy conservation
Sidharth K A	2016 2018	Undergoing Live in lab project: System Design for Integrating Technologies for Building waterwise communities, Jharkhand Anokha Public Relations and Security Activities
Soundarya S	2017	Attended workshop on Radioactivity organized by IGCAR, Anokha 2017
Surya Kumar G	2018 2018	Completed online course : My Captain IIMB accumulated for Finance and online marketing Attended workshop on radioactivity organized by IGCAR, Anokha

9.7.2 College Techfest (ANOKHA)

ANOKHA is the national engineering techfest of Amrita School of Engineering, Coimbatore India. Having successfully completed eight editions, ANOKHA has had an average annual participation of over 10,000 students from top-ranking engineering institutions in India like IITs, BITS, NITs and IIITs participating as well as partner universities in USA and Europe like University of New Mexico, EVRY France and Uppsala University-Sweden. It has a prize-money of Rs. 15 lakhs with 100+ plus highly competitive contests in all disciplines of engineering, sciences, robotics, gaming, business incubation, social media & entrepreneurship, cubing and short-film making. Taking up themes of global importance and societal relevance like Innovation, sustainable development, green trends, Technopolis - smart city and national security, it witnesses 30+ workshops in various cutting-edge areas of various engineering disciplines, robotics, business, sciences & humanities, start-up pitchfest and finance including its own edition of TEDx-like distinguished talk series called “Lumiere” (Annexures 16e,f and g).

The workshops have been offered by leading companies such as Amazon, Microsoft, Mathworks, Cisco, Intel, National Instruments and Robert Bosch. Other highlights of the techfest include fascinating exhibitions & Autoshows, Meet the CEO programme, school outreach and product design, development & demonstration. Anokha provides the students an invaluable chance to discover, develop and demonstrate their talent, to excel and provides an innovative podium to stand on and succeed. This student-driven techfest showcases and celebrates the innovation, ingenuity, teamwork and talent of engineering students of AMRITA. Some of the world renowned artists who have been part of the entertainment spectacle include Percussionist, Sivamani; playback singers, Vijay Prakash, Karthik, Benny Dayal, Haricharan, Rahul Nambiar, Alaap Raju, Shaktisree Gopalan, Sunitha Sarathy, Ranjani-Gayatri and Nikita Gandhi.

Conduct of a techfest of this magnitude and proportions, for the students and by the students, develops organizational and leadership skills; enlarges their vision; exposes them to new technologies and innovation; facilitates and offers a platform for interaction with leading tech companies; and lastly this association among peer groups from across the length and breadth of the country promotes a sense of national integration.

Following are some of the events conducted by department of Chemical Engineering and Materials Science in ANOKHA 2017

A two-day workshop in which the delegates from Indian Association of Nuclear Chemists and Allied Scientists (IANCAS), association of Indira Gandhi Centre for Atomic Research (IGCAR), explain the fundamentals of nuclear and radiochemistry, the use of radio isotopes and radiation sources in education, research, agriculture, and medicine. It Includes a discussion about a career in department of atomic engineering and also includes student poster presentation. The delegates include, Shri C R Venkata Subramani, Raja Ramanna Fellow in chemistry group, IGCAR and the president of IANCAS-SRC, Advisor (Retd.) to director, IGCAR, Shri. G.V. S Ashok Kumar, Scientific Officer/ D, IGCAR, Dr. K.A. Venkatesan, Scientific Officer/G, IGCAR, and Dr. R. Kumaresan, Scientific Officer/E, IGCAR. The also included technical events such as Fix It Felix, ChemEQuiz, Tech-A-Thon, and model Industrial Conference which all included a maximum prize of upto Rs. 15,0000. Some snapshots include

The events of ANOKHA 2018 conducted by department of Chemical Engineering and Materials and Science includes a workshop on ASPEN HYSYS – A Hands on Approach to Process Modeling

& Simulation, andother technical events such as CHEM E-CAR, Fix-It-Felix 2.0 - Industry Defined Problem, Research Conclave, and TECHATHON - A Technical Treasure Hunt which all included a maximum prize of upto Rs. 20,000. Some snapshots of ANOKHA 2018 include

9.7.3 Extra-Curricular Activities – Sports

Amrita School of Engineering encourages the students to be healthy in body and mind. Sports provide an excellent opportunity for students to interact with each other, develop true sportsman spirit and team spirit, as well as to stay healthy. The Students of Amrita School of Engineering are

divided into four teams viz Amritamayi, Anandamayi, Chinmayi and Jyothirmayi. The Students participate in clean and fair voting to select their Captains and Vice Captains. The Intramural Events are conducted during the Annual Sports Meet. Staff Tournaments are also conducted in certain games / event every year in both sections. Our students regularly participate in South Zone / All India Inter University Competitions and National Level Inter Collegiate Tournaments.

· **Infrastructure (**Annexure B.17a)

§ Outdoor Games:

1). Basketball (M & W)	2). Ball Badminton (M&W)
3). Cricket (M)	4). Football (M)
5). Kabaddi (M)	6). Tennis (M & W)
7). Volleyball (M & W)	8). Tennikoit (W)
9). Swimming (M & W)	10). Hockey (M)
11). Handball (M)	12). Throw ball (W)
13). Athletics (M & W)	14). Frisbee (MW)

§ Indoor Games:

1). Carrom (M&W)	2). Chess (M&W)
3). Shuttle Badminton (M&W)	4). Table Tennis (M&W)
5). Weight Lifting (M)	6). Power Lifting (M)

§ Gymnasium: There are three gymnasiums in the Campus with the following equipment:

§ Cardio Equipment:

1) Up Ride Bicycle (Viva fitness) 2. Imported Motorized Treadmill (Motus 900)

2) Elliptical Cross Trainer (Motus & Viva Fitness)

§ Strength Equipment: 6 in 1 Multi Gym, 12 in 1 Multi Gym, 8 Station Multi Gym, 10-in-1 Personal Gym, Twister , Cable Crossover, Hacks Squat, Smith Machine, Calf Rise, Inner & Outer Thigh, Nelco Weight Lifting Set, Benches (Incline, Decline, Flat and Multi Purpose), T-Bar Rower, Preach Curl Stand, Dumbbells (with Rubber Rings and with groove) , Barbell Plates, Barbell Rods Set (4 Different Size) and Rod Racks.

Student Activities- Sports: Students are participating every year in various tournaments such as **(**Annexure B.17b):

· Coimbatore District Level Association Tournaments

§ National / International Tournaments organized by other Universities

§ Inter Collegiate Tournaments conducted by some other colleges

§ Inter Campus Tournaments of our own five campuses.

§ Inter University Tournaments-All India / South Zone Level

Programmes Conducted:

§ Talent Search for Freshers,

§ Intramural Competitions for all students

§ Annual sports day for every academic year

§ Inter-Campus Tournament in Selected Disciplines

§ Summer and Winter Coaching Camps in Swimming.

§ Friendly Matches in Intra and Inter Departmental Level

§ Amrita Super League (ASL)-Staff & Students Combined Sevens Football Tournament. (viii). Amrita Premier League (APL) - Intra Campus Level T20 Tournament.

§ Organizing South Zone Inter University Tournaments in selected Games.

The following students have participated/secured prizes in sports events

Table B.9.7.1c Participation/ Prizes in Sports Events

Name of the student	Month/Year	Details of award/recognition/grants received
Prateeka Haldori	2017 2018 2018 2018 2018 2018	Won 1st place in intramural Table Tennis Won 1st place in intercampus Table Tennis Won 1st place in Aagneya Table Tennis doubles Won 2nd place in intramural Table Tennis Won second place in cricket Won 1st place in Aagneya Table Tennis doubles
Santhoshi R B	2018 2017-2018	Participant in cricket match in interhouse competitions Participant in interhouse throwball competitions

Name of the student	Month/Year	Details of award/recognition/grants received
S.Subash	2018 2018	Interamrita,Banglore(Runners) Won Sastra University Match (3rd Place) Manipal University Handball Match (Participated) Interamrita Handball match (Runners) University Handball Match ,Kurnool, Andhra Pradesh (Participated)
J Vaishnavi Sree	2019 2017-2019	Selected to south zone 2018,Chess, Interamrita (University selection) Attended all the intramural, intracampus and interuniversity chess tournaments
Yashwant S	2017	Participated in interhouse volleyball tournament

Name of the student	Month/Year	Details of award/recognition/grants received
Ashuthosh Pandey	2016-2017 2017-2018 2017-2018	Secured first position in inter amrita chess tournament during the year 2016-2017. Secured second position in inter amrita chess tournament during the year 2017-2018. Represent my university on South zone competition during the academic year 2017-2018.
Hari Priya P	2017 2018 2017 2018 2017-2018	Participated and won 2nd place in Intercampus match in volley ball and table tennis,Mysore Participated and won 1st place in Intercampus match in volley ball and table tennis,Bangalore Participated and won 2nd prize in Intra campus matches in volley ball Participated and won 2nd prize in Intra campus matches in volley ball Participated in cricket and basket ball matches Won 1st place in Ball badminton Won 2nd place in Badminton

Name of the student	Month/Year	Details of award/recognition/grants received
	2017	
Jeganath R	2018 2016-2017	Represented Inter-amrita basketball matches Runner up in Amrita Basket Ball league
Kabilesh R	2017	Participant in house cricket matches at Amrita
Kamalesh K	2018	Participated in Amrita Super league (Football) held at Amrita, Coimbatore Participated in house matches,Coimbatore

Name of the student	Month/Year	Details of award/recognition/grants received
Mohammed Shifan	2016 2017	Ist prize –Intracampus Volley ball Ist prize-Intracampus Volley ball Ist prize –Intracampus –Volley ball
Sidharth K A	2018 2016	Won the 1st prize in Intracampus carom Won the 2nd prize in intracampus carom
Vaishak M S	2016 2018	Won 2nd prize in Carroms (Intra campus) Won 1st prize in Carroms (Intra campus)

State of the Art Facilities:

§ **Swimming Pool:** Amrita Swimming Pool is of Olympic Standard with 50m X 25m in Size and contains 2.4 million litres of water. A Toddlers Pool is to accommodate babies and for the professionals to have Warm-Up. State-of art machinery purifies 2.4 million liters of water with in six hours. It is one of the few international standard swimming pools wherein the State, National and International Swimming Competitions can be conducted.

§ **Synthetic Tennis Court:**

§ **Arogya Sadanam (New Gym):** A multi purpose Indoor Gymnasium with a size of 8200sq feet consists of 4 Shuttle Synthetic Badminton Courts, 2500 Sq Feet of Gym Centre and playing provision for Table Tennis, Carom Boards and Chess.

§ **Work In Progress:** A Standard Basketball Court near Vasishta Bhavanam, and Specialized 3 Concrete & 2 Mud Cricket Pitches.

§ **Aagneya Sports Club:** Sports Club Aagneya plays a vital role in conducting various Sports Events at Intra Campus Level Open Tournaments such as Campus Marathon, Amrita Badminton League, Amrita Basketball League, Amrita Volleyball League, Amrita Table Tennis League, etc. Student Officer Bearers organize the events. It gives a platform to bring out the sporting talent from a larger group.

Students winning laurels in South Zone/ National level sports are awarded grace marks (Annexure B.17c)

9.7.4 Extra-Curricular Activities –Student Clubs

16 student-managed Clubs are active in the campus (Table-2).The dedicated Student Counsellors encourage students in participating in the various extracurricular activities. Students are encouraged to join at least one of the following Student Forums to fine tune their innate raw talents to ultimately compete in various competitions held at National and South East Asian Levels. It is ensured that the quality and content of the programs organized by these forums are in tune with the Norms of the Association of Indian Universities.

Table B.9.7.4a Cultural Forums and Social Clubs (Annexure B.18a)

	Name of the Club
1	Amrita Talkies
2	Asthra - Science Club
3	Kalakriti- Arts Club
4	N dam
5	Nature Club
6	Natyasudha –Dance Club
7	NSS
8	Photography Club
9	Team Media
10	Ragasudha
11	Sahaya Club
12	Srishti Club MUN. Toast Masters
13	Aagneya - Sports Club

	Name of the Club
14	Vision – Eye Donation Motivation Forum
15	Wellness Club
16	SPIC MACAY

Events Conducted by student Clubs – Given at **(**Annexure B.18b)

Participation in Association of Indian Universities (AIU) – **(**Annexure B.18c_

NSS Activities 2017-2018: The summary of NSS activities carried out by the students of Amrita is given below:-

Table B.9.7.4b NSS activities

Year	Activity
11 Mar 2017	Lake Cleaning Drive- Selva Chinithamani Kulam Lake
28 Mar 2017	Blood Donation Camp
13 Oct 2017	Safe Diwali – Say NO to crackers
14 Oct 2017	Tree Plantation Drive - Campus
15 Oct 2017	NSS volunteers of Unit 1 paid a visit to Mother Theresa Old age home at Puliayakulam, Ramanathapuram Coimbatore
18 Jan 2018	Health Awareness Programms – NSS & GEM Hospital

Year	Activity
21 Jan 2018	Lake Cleaning Drive -Kumarasamy lake- Muthannankulam
24 Jan 2018	National Youth Day Celebrations
24 Jan 2018	The Aswin Maharaj Foundation music therapy for cancer patient
15 Feb 2018	Blood Donation Camp
15 Aug 2018	Cleaning of 3km stretch of road - part of the Swachata Pakhwada

· **Conduct of Festivals & Cultural Events**

Various Festivals and events are organized in the campus to promote harmony and awareness on the Indian Culture. Celebrations are organized on the occasion of Gurupoornima, Navarathri, Ugadi, Pongal, Onam, Ganesh Chaturthi, Gokulashtami, National Nutrition Week, International Yoga Day, and Amma's Birthday.

§ Talent Search: It is a vibrant and extensive program, spanning over several weeks, organized to identify the freshmen having raw talents in dramatics, skits, quiz, dance, music, debate, literature, sports and games etc. The freshmen participate enthusiastically in large numbers and exhibit their talents.

§ Amritotsavam: It is the mega annual cultural festival, spreading over a couple of weeks, with a large participation of students and staff. Cultural events, quiz, debates, songs, dances, essay competitions etc are organized completely by the students who invariably enrich their leadership qualities and team spirit.

§ Gokulashtami: The birthday celebrations of Sri Krishna are conducted with a lot of pomp and splendor. The campus takes on a festive look and the students, faculty and non-teaching staff show extraordinary zeal and commitment in organizing various vibrant cultural programs. A grand procession with floats depicting various significant episodes in the life of Sri Krishna is a major attraction. Students are exposed to fabrication work, group performances and organizing skills.

§ Amma's Birthday: Our Chancellor's Birthday is celebrated on 27th of September every year at Amritapuri. A large number of dignitaries along with thousands of devotees from all walks of life belonging to various countries gather to get the blessings of Amma. Our students and faculty members render voluntary services. Students develop project management and leadership skills while actively participating in organizing such a mammoth event.

Students participated/secured prizes in festivals/cultural events /seva activities/club events

Table B.9.7.4c Student Participation/Prizes in festivals/cultural events /seva activities/club events

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants received
CB.EN.U4CHE16010	Anathapadmanabhan	2018	Participant - Gokulashtami Quiz 2018

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants received
CB.EN.U4CHE16013	Ashuthosh Pandey	2017-2018	. Represent my university on South zone competition during the academic year 2017-2018.
		2017	Secured second position in western solo singing competition in Amritotsavam 2017.
		2017	Secured first position in classical group singing competition in Amritotsavam 2017.
		2017	Secured second position in western group singing competition in Amritotsavam 2017.
		2017-2018	Secured second position in western group singing in AIU 2017-2018.
		2017-2018	Participated in solo singing competition by Lucid production in Coimbatore.
		2016-2017	Partition in debate competition during the academic year 2016-2017.

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants received

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants received
CB.EN.U4CHE16017	Deepak Suresh Varma	2018	Volunteer-Swatch Bharath
CB.EN.U4CHE16020	Hari Priya P	2018	Volunteer of Swach Bharath Seva
CB.EN.U4CHE16025	Kamalesh K	2018	Participant in Swatch Bharath ,2018
CB.EN.U4CHE16029	Mohammed Shifan	2018	Volunteer : Swach Bharat Program
CB.EN.U4CHE16030	Naageshwaran M	2018	Volunteer Amritavarsham 2018
CB.EN.U4CHE16033	S Prashanth	2018	Swatch Bharath Seva Volunteer

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants received
CB.EN.U4CHE16034	Rashmi N	Sep 2018	Volunteer in social work at Attapadi village
CB.EN.UECHE16039	Shivahari G	2017 2017 2016	Won second prize in Indias folk dance Amritotsavam Split screen participant,Amritotsavam,2017 D4 Dance season 3 Participant Channel: Mazhavil Manorama
CB.EN.U4CHE16040	Sidharth K A	2018 2016 2018	Volunteer in Swach Bharat campaign Volunteer in Ammas Birthday Programme Anokha Public Relations and Security Activities
CB.EN.U4CHE16041	Soundarya S	2018	Volunteer in Swatch Bharath

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants received
CB.EN.U4CHE16043	Surya Kumar G	2018	Participated in Swatch Barath 2018,Amrita Vishwa Vidyapeetham
CB.EN.U4.CHE16046	Vaishak M S	2018	Volunteer of Swachh Bharat Seva

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE16010	Anathapadmanabhan	2018	Participant - Gokulashtami Quiz 2018

CB.EN.U4CHE16013	Ashuthosh Pandey	2017-2018 2017 2017 2017 2017-2018 2017-2018 2016-2017	. Represent my university on South zone competition during the academic year 2017-2018. Secured second position in western solo singing competition in Amritotsavam 2017. Secured first position in classical group singing competition in Amritotsavam 2017. Secured second position in western group singing competition in Amritotsavam 2017. Secured second position in western group singing in AIU 2017-2018. Participated in solo singing competition by Lucid production in Coimbatore. Partition in debate competition during the academic year 2016-2017.

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE16017	Deepak Suresh Varma	2018	Volunteer-Swatch Bharath
CB.EN.U4CHE16020	Hari Priya P	2018	Volunteer of Swachh Bharath Seva
CB.EN.U4CHE16025	Kamalesh K	2018	Participant in Swachh Bharath ,2018
CB.EN.U4CHE16029	Mohammed Shifan	2018	Volunteer : Swachh Bharat Program
CB.EN.U4CHE16030	Naageshwaran M	2018	Volunteer Amritavarsham 2018
CB.EN.U4CHE16033	S Prashanth	2018	Swachh Bharath Seva Volunteer

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE16034	Rashmi N	Sep 2018	Volunteer in social work at Attapadi village
CB.EN.UECHE16039	Shivahari G	2017 2017 2016	Won second prize in Indias folk dance Amritotsavam Split screen participant,Amritotsavam,2017 D4 Dance season 3 Participant Channel: Mazhavil Manorama
CB.EN.U4CHE16040	Sidharth K A	2018 2016 2018	Volunteer in Swachh Bharat campaign Volunteer in Ammas Birthday Programme Anokha Public Relations and Security Activities
CB.EN.U4CHE16041	Soundarya S	2018	Volunteer in Swachh Bharath

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE16043	Surya Kumar G	2018	Participated in Swachh Bharath 2018,Amrita Vishwa Vidyapeetham
CB.EN.U4.CHE16046	Vaishak M S	2018	Volunteer of Swachh Bharat Seva
CB.EN.U4CHE17007	Amrithanand Anil Malayil	2018	Participated in Kerala Flood relief Campaign
CB.EN.U4CHE17007	Alan Antony	2018	Participated in Kerala flood relief Campaign

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE17010	Anirudha	2018	Participated and won 2nd prize in Gokulashtami mime Participated in quiz conducted by Shristi club
CB.EN.U4CHE17011	Anuragavi T S		Doing a degree in Bharathanatyam (Advanced Diploma in Fine Arts) Choreography for outside school annual days Participated in the communal harmony week celebration conducted by Govt. of India, Amrita ,Coimbatore
CB.EN.U4CHE17017	R.Balasubramaniyan	Jan 2018	Volunteer for Amma's visit to Kovai Participated in Swachh Bharat Campaign

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
			Volunteer of U and I organization helping underprivileged kid in education
CB.EN.U4CHE17019	C.Girish	2018	Participated in intercollege dance competitions (Sastra , NIT Calicut, Sacred heart college Kochi)
CB.EN.U4CHE17020	Hariharaan R K	2018	Won prize for slogan writing ,World mental health day competitions
CB.EN.U4CHE17026	Kavya Easwar	2018	Secured second prize in ADZAP competition for Amritotsavam 2018
CB.EN.U4CHE17035	A R Nagarajan	2018	Won 1st prize in Adzap event in Amritotsavam,2018

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE17036	Mohan Krishna	2018	Member of Amrita's Ayudh wing to teach students
CB.EN.U4CHE17039	Prateeka Haldori	2017	Participated in Gokulashtami solo dance competition
CB.EN.U4CHE17042	K Ravishankar	2018	Participated in Swachh Bharath Campaign
CB.EN.U4CHE17044	N R Sai Maadesh	2018	Won second prize in Adzap competition, Amritotsavam 2018 Participated in mythology quiz as a part of Amritotsavam 2018 Participated in vision club treasure hunt

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE17050	Sreehari A B	May 2018	Participated and won 2nd prize in Gokulashtami mime
CB.EN.U4CHE17056	Vijay S	2018	Participated in Srishti club quiz Participated in Film quiz conducted by Dept.of Mass Communication Won 2nd prize in mime in Gokulashtami 2018
CB.EN.U4CHE17057	Vijaya Raghavan	2018	Won second place in Gokulashtami ,Mime 2018 Won 2 nd place in Adzaap and coordinator of club activities Participated in blood donation camp at Amrita
CB.EN.U4CHE17059	P Vishnu Pratap	2018 2018	Won 1st prize in Paradox in Anokha 2018 Won first prize in treasure hunt organized by Social work dept

Roll no:	Name of the student	Month/Year	Details of award/recognition/grants recieved
CB.EN.U4CHE17060	Yashwant S	2018	Won second prize in Amritotsavam Dumb charades

Sections B.9.8-9.10 are additional sections provided over and above the requirement of the NBA-SAR template.

9.8 Student Support Committees:

The following Committees are in place to support the students and also to ensure and promote discipline in the campus (Annexure B.19):

- A general Disciplinary Committee – Chairperson and 15 members
- Anti-Ragging Committee- Chairperson and 7 members
- Women's Complaints and Redressal Cell - Chairperson and 3 members
- SC/ST Complaints & Redressal Cell – Chairperson and 4 members
- Emergency Response Team – 11 members

9.9 Insurance Plans for Students:

Our Institution is providing different kinds of insurance plans for our students to attain the maximum benefits at the time of unpredictable events.

- **Amartya Siksha Yojana-(Students Education Protection Policy):** This policy provides protection for the education of the students in case of the occurrence of any unforeseen events to the insured parent /guardian such as, Accidental death /permanent total disability due to accident/ death during surgical operation or death within seven days thereafter whilst in the hospital. In the event of such death, the entire educational expenses of the student concerned will be met by the insurance company till his / her completion of the course in this institution.
- **Special Contingency Insurance Coverage:** This policy covers the reimbursement of Medical expenses incurred by the students due to accident occurred while the students are commuting to college / inside the campus / participation in authorized tours , excursions etc. Accidental claims shall be made up to `2 Lakhs per year.
- **Sampoorna Suraksha:** Life Insurance coverage to the students and active till their completion of their studies in our Institution. Upon the happening of death of the insured (due to any cause), 3 Lakhs is payable to their nominee.

9.10 Amritanidhi Scholarships (Annexure B.9.20) –

Scholarship is awarded as fee waiver for first year, based on the rank scored in the All India Amrita Entrance Examination. A candidate has to score a minimum CGPA without any arrear at any point of time as per the University rules, in order to earn the fee waiver in the subsequent years. Scholarship amount is reimbursed in September after the last date of admissions. Scholarship will be withdrawn if the student gets involved in any disciplinary action during his / her period of study in the university. Scholarship is renewed on request in subsequent years on consistent academic performance by securing CGPA scores as given below:-

- For 2016 & 2017 batch students

o 8.0 and above in the case of award of 90% scholarship.

o 7.5 and above in the case of award of 50% scholarship.

o 7 and above in the case of award of 25% scholarship.

- For 2018 batch students

o 8.0 and above in the case of award of 90% scholarship.

o 7.5 and above in the case of award of 75% scholarship.

o 7 and above in the case of award of 50% scholarship.

In respect of the previous batches, scholarship amount of Rs50,000/- per annum was given and the students are eligible if they have secured a CGPAmore than 6, without possessing any arrears. The status of disbursal of scholarship for the past three years is as follows:

Status as follows:

Table B.9.10 Amritanidhi Scholarships

Academic Year - 2016-17							
DEPT	2013-IVyr	2014-III Yr	2015-II Yr	2016 – I Yr			Dept wise
	Rs.50000	Rs.50000	Rs.50000	90 %	50 %	25 %	total
AE	4	4	3	1	1	0	13
CIVIL	5	3	3	0	0	0	11
CSE	14	10	11	18	25	31	109
CHEMICAL	7	5	3	0	0	0	15
ECE	6	10	10	2	9	2	39
EIE	4	4	0	0	0	0	8
EEE	7	3	6	0	0	0	16
MECH	3	4	3	2	4	10	26
TOTAL	50	43	39	23	39	43	237

Academic Year - 2017-18									
DEPT	2014 - IVyr	2015 – III Yr	2016 – II Yr			2017— I Yr			Dept wise
	Rs.50000	Rs.50000	90 %	50 %	25 %	90 %	50 %	25 %	total
AE	4	3	1	0	0	0	2	2	12
CHEMICAL	3	3	0	0	1	0	0	0	7
CIVIL	5	2	0	0	1	0	0	0	8
CSE	10	10	13	30	25	15	22	23	148
ECE	10	10	3	1	7	4	7	6	48
EIE	3	0	0	0	0	0	0	0	3
EEE	4	6	0	0	0	0	1	2	13
MECH	4	3	3	8	5	3	8	7	41
TOTAL	43	37	20	39	39	22	40	40	280

Academic Year - 2018-19											
DEPT	2015-IVyr	2016 III Yr			2017 – II Yr			2018 - I Yr			Dept wise
	Rs.50000	90%	50%	25%	90%	50%	25%	90%	50%	75%	total
AE	3	1	0	0	0	2	2	2	4	2	16
CIVIL	1	0	0	1	0	0	0	0	2	0	4
CSE	10	13	29	25	12	15	18	44	55	38	259
CHEMICAL	2	0	0	1	0	0	0	0	0	0	3
ECE	10	3	0	6	1	3	6	4	23	7	63
EIE	0	0	0	0	0	0	0	0	0	0	0
EEE	4	0	0	0	0	0	2	1	0	3	10
MECH	2	2	7	5	3	5	6	0	14	4	48
TOTAL	32	19	36	38	16	25	34	51	98	54	403

CRITERION 10: Governance, Institutional Support and Financial Resources (120)

10.1. Organization, Governance and Transparency

Amrita Vishwa Vidyapeetham is a multi-campus, multi-disciplinary research academia that is accredited 'A' by NAAC and is ranked as one of the best research institutions in India. The Chancellor of the University, Mata Amritanandamayi Devi, is a world renowned Humanitarian and Spiritual leader who strives to bring peace and prosperity to the entire world. Under the guidance of the Chancellor, Amrita has consistently been ranked in the top 10 Universities in India and was ranked 8th in the Universities category by the National Institutional Raking Framework (NIRF) in 2018 and 2019. Amrita Vishwa Vidyapeetham continuously collaborates with top US Universities including Ivy league universities and top European universities for regular student exchange programs, and has emerged as one of the fastest growing institutions of higher education in India. The School of Engineering is equipped with best-in-class infrastructure and highly qualified faculty.

10.1.1. State the Vision and Mission of the Institute

Vision:

To be a global leader in the delivery of engineering education, transforming individuals to become creative, innovative, and socially responsible contributors in their professions.

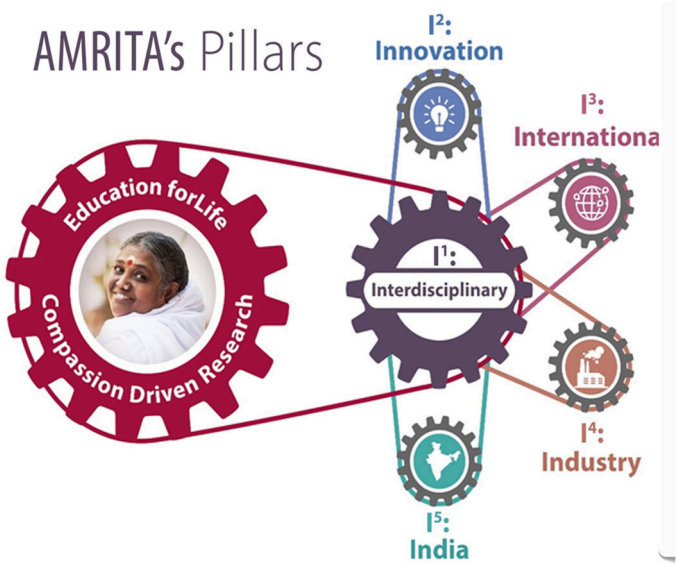
Mission:

- To provide best-in-class infrastructure and resources to achieve excellence in technical education,
- To promote knowledge development in thematic research areas that have a positive impact on society, both nationally and globally,
- To design and maintain the highest quality education through active engagement with all stakeholders – students, faculty, industry, alumni and reputed academic institutions,
- To contribute to the quality enhancement of the local and global education ecosystem,
- To promote a culture of collaboration that allows creativity, innovation, and entrepreneurship to flourish, and
- To practice and promote high standards of professional ethics, transparency, and accountability

10.1.2. Availability of the Institutional Strategic Plan and Its Effective Implementation and Monitoring

Quality and commitment have been the corner stones for the success of Amrita. Being a multi-campus, multi-disciplinary university, decentralized administration was essential to maintain agility and quality. The concept of process and process owners facilitated decentralization of activities and delegation of authority, while maintaining accountability. After being awarded the “Deemed to be University” status in 2003, Amrita’s recognition can be attributed to the key five strategic pillars:

- Inter-disciplinary
- Innovation
- International
- Industry
- India



Building on these strategic pillars is absolutely critical for Amrita to be recognized as a world class university

a. Inter-disciplinary:

Offer degree programs that are inter-disciplinary/intra-disciplinary in nature. The degree programs are designed to fit with the thematic research areas of the school.

Initiate and secure funds for inter-disciplinary projects from Govt agencies and industry

Four new programs that are intra/inter-disciplinary in nature will be introduced from AY 2019-20. Five more programs involving automation &

rural technology, cyber physical system security and forensics, data analytics and medical systems, vision based systems for smart transportation and bioinformatics will be introduced between calendar year 2021-2026.

b. Innovation:

Innovative teaching-learning process: Strengthening the curriculum and introducing pedagogical changes that would trigger better knowledge gain. Introduction of modular mathematics courses was implemented in 2015. It is planned to further modularize the mathematics courses during the 2019 curriculum revision.

Introduce flexible curriculum with open electives across all engineering departments. The 2019 curriculum aims at being flexible and learner centric.

Carry out innovative research that can result in patents and entrepreneurship. A 20% increase in patent filing was observed from 2015-19 relative to 2010-15. The goal is to be able to file at least three patents a year from the School of Engineering.

c. International:

Currently, more than 140 MoU's have been signed with foreign universities which allow student exchange programs, dual degree programs, internships and projects. The strategic plan calls for at least an additional 100 MoU's with universities ranked in the top 500 of the world ranking.

Goal is to increase the number of collaborations with reputed foreign universities by 50% in the next 5 years.

d. Industry:

Amrita's engagement with industry is critical to ensure that (a) the curriculum and pedagogy matches with the needs of the industry; (b) to ensure that the research problems chosen are industry relevant problems and (c) industry gets a chance to assess the calibre and quality of Amrita.

Goal is to increase the industry consultancy amount by 50% relative to 2018 funding amount.

e. India:

The founding trust of Amrita has adopted 103 villages across India. Experiential learning (named as Live-in-Labs), introduced in 2015, is part of the curriculum. Primary goal is to ensure that the society benefits from all the research work done at Amrita.

Monitoring the execution of the strategic plan is handled by the Board of Management, which is the Apex body of Amrita.

10.1.3. Governing body, administrative setup, functions of various bodies, service rules, procedures, recruitment and promotional policies

Other academic and research progress are handled by various committees comprising of administrators, chairpersons, professors and faculty members of the departments. The following committees are in place to provide directions, make decisions, implement and monitor progress of various functions.

1. The Board of Management consists of the following members:

• Swami Amritaswarupananda Puri	President
• Swami Ramakrishnanada Puri	Member
• Br. Abhayamrita Chaitanya, Pro-Chancellor	Member
• Dr. P. Venkat Rangan, Vice Chancellor	Member
• Dr. Prem Nair, Dean – Faculty of Medicine	Member
• Dr. Bipin Nair, Dean – Faculty of Sciences	Member
• Dr. Shanti Nair, Dean, Research	Member
• Dr. U. Krishnakumar, Dean - Faculty of Arts, Media & Commerce	Member
• Dr. K. Sankaran, Registrar	Member Secretary

Board of Management (BoM) consists of 9 members and conforms to guidelines set by regulatory bodies, and includes; three humanitarian leaders who are also authors of several scholarly books, one institutional leader, four eminent scientists, one eminent doctor.

BoM meets at least twice a year to both review past progress and approve future plans. BoM handles the following important aspects:

I. To establish campuses, schools, centers and departments with adequate investment in infrastructure and quality of faculty
II. To maintain a highly professional ambience and environment for faculty, students and staff to succeed and to redress grievances
III. To confer, grant or award Degrees, Diplomas, Certificates and other academic titles and distinctions
IV. To maintain proper accounts and other relevant records
V. To ratify all appointments of Faculty and Staff

2. Academic Council

List of Members:

1. Br. Abhayamrita Chaitanya (Pro-Chancellor)

2. Dr. P. Venkat Rangan (Vice Chancellor) - Chairman
3. Dr. K. Sankaran (Registrar)
4. Dr. Prem Nair (Dean – Faculty of Medicine)
5. Prof. C. Parameswaran (Director, Corporate & Industry Relations)
6. Dr. Bipin Nair (Dean – Faculty of Sciences)
7. Dr. Shanti Nair (Dean Research)
8. Dr. Sasangan Ramanathan (Dean – Faculty of Engineering)
9. Dr. V.S. Somanath (Dean – Faculty of Business)
10. Dr. Krishnashree Achuthan (Dean, PGP Programmes)
11. Dr. Maneesh Sudheer (Dean International Programmes)
12. Dr. Balakrishnan Shankar (Associate Dean, Amritapuri Campus)
13. Dr. R. Dhandapani (Controller of Examinations)
14. Br. (Dr.) Sankara Chaitanya (Director, School of Ayurveda)
15. Br. Sudeep (Director, Amritapuri Campus)
16. Br. Dhanraj (Director, Bangalore Campus)
17. Dr. U. Krishnakumar (Dean – Faculty of Arts, Media & Commerce)
18. Br. Sunil Dharmapal (Director, Mysuru Campus)
19. Dr. C. R. Muthukrishnan (Former Dy. Director, IITM – External Member)
20. Dr. V. Radhakrishnan (Former Prof., IITM – External Member)
21. Dr. A. H. Kalro (Former Director, IIMK - External member)
22. Dr. Bharat Jayaraman (Professor, SUNY Buffalo – External Member)
23. Dr. Jyothi S. N (Principal, School of Engineering, Amritapuri Campus)
24. Dr. S. G. Rakesh (Associate Dean, Bangalore Campus)
25. Dr. Vishal Marwaha (Principal, School of Medicine)
26. Dr. Balagopal Varma R (Principal, School of Dentistry)
27. Prof. K. T. Moly (Principal, College of Nursing)
28. Dr. M. Sabitha (Principal, School of Pharmacy)
29. Dr. Vasudevan Nampoothri (Principal, School of Ayurveda)
30. Prof.C Vidya Pai (Principal, School of Arts & Science, Mysuru)
31. Dr. M. Savitha Pande (Principal, School of Education)
32. Dr. Nandakumaran V. M. (Principal, School of Arts & Science, Amritapuri Campus)
33. Dr. Sriram Devanathan (Prof. Dept. of Chemical Engineering, Coimbatore)
34. Dr. Raghuraman (Chairman, School of Business, Coimbatore)
35. Prof. Sunanda Muralidharan (Chairperson, Dept. of Management, Kochi)
36. Prof. Manoj P (Chairperson, Dept of Management, Bangalore)

The Academic Council meets at least twice a year to deliberate on the following functions:

- To prescribe and ratify courses of study leading to degrees and diplomas

- To take periodical review of the activities of the Schools/Departments/Centres and to take appropriate action with a view to maintaining standards of instruction
- To devise measures for improvement of standards of teaching, research and training
- To frame policies with regard to admissions
- To ensure fair conduct of examinations
- To award fellowships and studentships, free-ships, concessions, travel fellowships, scholarships, medals, prizes etc.
- To put in place guidelines for attendance and discipline

3. Executive Committee

   List of Members:
   Dr. S Mahadevan (Dy. Dean) – Chairman
   Mr. N Ravindran (GM Purchasing)
   Br. Harikumar (Manager, Finance)
   Frequency of Meeting: Once a week

4. Research Committees also called Thrust Area Groups
   - The quality of research is handled at the department level by thrust area groups.
   - Chairperson oversees the progress of research.

5. Internal Quality Assurance Cell (IQAC)

   The IQAC is the quality monitoring cell with members from all departments, centers and administrative offices. There a total of 60 members.

   IQAC aims to develop a system for conscious, consistent and catalytic action to improve the academic and administrative performance of the institution. IQAC evolves mechanisms and procedures for ensuring timely, efficient and progressive performance of academic, administrative and financial tasks, optimization and integration of modern methods of teaching, learning and evaluation and ensuring the adequacy, maintenance and functioning of the support structure. Some of the functions of the IQAC are:

   - Development and application of quality benchmarks/parameters for the various academic and administrative activities of the institution.
   - Dissemination of information on the various quality parameters of higher education.
   - Organisation of workshops, seminars on quality related themes and promotion of quality circles.
   - Documentation of the various programmes/activities leading to quality improvement.
   - Preparation of the Annual Quality Assurance Report (AQAR) to be submitted to NAAC based on the quality parameters.

Frequency of meeting is at least twice a year.

6. Library Committee
   Dr. M Sethumadhavan (Head, Center for TIFAC-CORE in Cybersecurity) – Chairman
   Dr. K M Mini (Chairperson, Dept. of Civil Engineering)
   Mr. M Sreevalsan (Head, ICTS)
   Dr. K. I. Ramachandran (Prof, Center for Computational Engineering and Networking)
   Frequency of Meeting: At least twice a year

7. Council of Wardens
   Prof S . Ranganathan – Chairman
   Mr. C. Arun Kumar (Dept of Computer Science & Engg) – Vice Chairman & faculty warden
   Dr. Saravanan (Dept of Mech Engg)
   Mr. P. Gopakumar (Manager, ICTS)
   Mr. Adarsh S (Dept. of Electronics and Communication Engg)
   Dr. K Bagavinar (Dept of Physical Education)
   Mr. Vijay Narayanan (Office of Dean Engg)
   Ms. R. Aarthi (Dept. of Computer Science & Engg)
   Dr. P. R. Janci Rani (Asst. Prof, Office of Student Welfare
   Frequency of Meeting: Once a month

8. Tech Fest Committee
   A total of 20 faculty mentors from various departments
   Total of 150 students
   Frequency of meeting: As and when needed

9. Sports Committee
   Dr. O J Kumaresan – Chairman
   Members are inducted from various departments depending on the nature of event being conducted
   Frequency: As and when required

10. Cultural Committee
    Dr. Shailendra K (Prof. Office of Student Welfare) – Chairman
    Members are inducted from various departments depending on the nature of event being conducted
    Frequency: As and when required

11. Purchase Committee
    Each department has its own purchase committee. Purchase committee can consist of anywhere between 3-5 faculty members.

Frequency of meeting: On an as needed basis

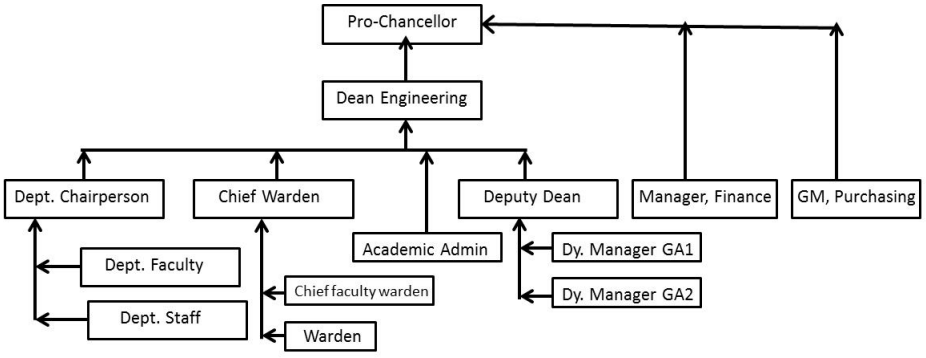


Fig. 10.1.3: Organization Structure (key functions shown) of the School of Engineering, Coimbatore

Recruitment Policy

Procedure for non-tenure appointments

All non-tenure Faculty appointments (Assistant Professors) as well as non-teaching appointments are done at School level by a committee consisting of Head of School, HR Head, Chairperson of the Department/Center and Senior faculty. In this aspect, there is a significant decentralization and empowerment of heads of schools in selection.

Faculty Recruiting & Promotions Committee

All tenure appointments i.e. associate professor and professor are evaluated and ratified by the faculty recruiting & promotions committees that include Deans of Faculties, Director, Human Resources, Chairperson of the department and senior professors. These appointments are based on peer review, presentation by faculty and interview. There is a conscious effort made by this committee to recruit talent from top institutes in India and abroad leveraging on the linkages facilitated by Amrita Centre for International Programs (ACIP).

Service rules

Service rules are framed by Board of Management of Amrita Vishwa Vidyapeetham so as to be in conformity with UGC regulations as well as best practices followed in

internationally well reputed Universities. These rules broadly fall under the following aspects:

- Teaching and instructional duties: Direct teaching to students includes scheduled classroom teaching of theory, laboratory sessions, and regularly scheduled project group meetings at bachelor's and master's levels. Indirect teaching includes mentoring sessions, research guidance to students, seminars, journal clubs, Ph.D. advising, etc. Mandatory minimum teaching (based on UGC rules) for all Amrita Faculty are set as 16 hours of direct teaching (classroom and laboratory, UG and PG) to students. In addition, there are indirect teaching hours, teaching preparation work hours, research work hours, all of which together should add up to a full working week. Any reduction from the above required hours of direct teaching can only be in lieu of following university approved duties:

- Departmental duties (2 hours per week only at the associate professor and professor levels)
- Sponsored Research Project responsibilities (up to 4 hours per week)
- Industrial consulting and management development programs (up to 4 hours per week)
- Clinical services (for clinical faculty)
- Senior administrative roles as assigned/appointed by the University

All faculty must attempt to use latest teaching methodologies, including ICT based methods, and provide access to such ICT rich learning material to students.

- Research duties: Research duties include publishing of research papers, patent filing, consultancy, securing funded extramural grants and organizing of international conferences. The mandatory research paper requirements are as follows:

Each department is mandated to organize one international conference every two years. While organizing such conferences University will give infrastructure support but the organizing faculty in the department is responsible to apply and secure adequate extra mural funding to cover travel and lodging of international delegates.

- Administrative duties: Faculty are expected to serve on departmental, school-level, campus-level and university-wide committees such as admissions, sports, cultural, techfest, discipline, anti-ragging cell, hostel etc.
- Societal & Community engagement: In alignment with the university's ethos and vision of the Chancellor AMMA, faculty are expected to actively contribute in various societal and community engagement initiatives such as Live-in-Labs, Swachh Bharat (Amala Bharatham), Village adoption, Green friends etc
- Appointment & Probation: An employee will be on Probation for a period of two years from the date of appointment which is liable to be extended at the discretion of the committee for further periods not exceeding one year. An employee will be confirmed in the permanent position only on satisfactory completion of probation.

Until the employee is informed in writing, an employee shall be deemed to be a probationer.

- Salary structure, perks and allowances: As per the prevailing norms, an employee appointed shall be paid monthly salary as mentioned in the appointment letter with effect from the of joining Amrita Vishwa Vidyapeetham
- Promotions: Any faculty member in order to qualify for continuing increments and/or promotion must demonstrate significant accomplishments in both teaching and research as prescribed from time to time by the University. The committee evaluates and ratifies all tenure promotions from assistant professor to associate professor, as well as, associate professor to professor. These promotions are based on peer review, presentation by faculty and interview by the committee. All multiple increments (other than routine annual cost of living increase increments) and promotions from assistant professor to associate professor, as well as, associate professor to professor, must be approved by faculty recruitment & promotions committee

- Superannuation: Superannuation age for employees of the Amrita Vishwa Vidyapeetham shall be 58 years, and shall superannuate on the last date of the month in which the employee attains the superannuating age.
- Termination of Appointment: An employee on Probation is liable to be terminated from service with either side serving one month notice period or salary in lieu of the notice period. A permanent employee in the Academic Departments shall serve three months' notice period or salary in lieu of the notice period which shall invariably be in a manner that shall not affect the academic responsibilities entrusted to a faculty and with due diligence. A permanent employee in the Non-Teaching Departments shall serve one month's notice period or salary in lieu of the notice period.

- Leave: An employee may avail leave as per the rules and regulation of Amrita Vishwa Vidyapeetham as will be in vogue at any given time.

Conduct

An employee shall adhere to the Conduct Rules of Amrita Vishwa Vidyapeetham, while in service failing which they are liable for punitive action for violation of such Rules and in the extreme case termination services without notice and/or compensation thereof. They shall be laid down as an Annexure to the appointment letter and each appointee shall be required to sign an acknowledge as having read and accepted the same. The conduct rules are as follows:

(a) Every employee shall at all times maintain absolute integrity and devotion to duty and also be honest and impartial in official dealings

(b) An employee shall at all times be courteous with other members of the staff, students, and members of the public

(c) Unless otherwise stated specifically in the terms of appointment, every employee is a whole time employee of Amrita Vishwa Vidyapeetham and may be called upon to perform such duties, as may be assigned by competent authority, beyond scheduled working hours and on Closed Holidays and Sundays. These duties shall inter-alia include attendance at meetings of Committees to which an employee may be appointed by Amrita Vishwa Vidyapeetham

(d) An employee shall be required to observed the scheduled hours of work, during which the employee must be present at the designated place of duty

(e) Except for valid reasons and/or unforeseen contingencies, no employee shall be absent from duty without prior permission

(f) An Employee should perform all the duties that are entrusted to the post designated to the employee and also any work that may be assigned by Dean/Chairperson/Competent Authority including attending to exam work assigned either by the Department or Amrita Vishwa Vidyapeetham during any time of the year. An employee shall work diligently and safeguard the interest and objectives of Amrita Vishwa Vidyapeetham at all times

(g) An employee will be responsible for the well being of students and their welfare while maintaining their discipline.

(h) Complete discipline and decorum shall be maintained in the campus and an employee shall not act in a manner that shall tarnish or be detrimental to the reputation of Amrita Vishwa Vidyapeetham

(i) No employee shall leave their duty station without the prior permission of the Competent Authority/Dean/Chairperson or Head of Department, during leave/vacation or otherwise. When leaving their duty station, they shall clearly inform in writing their contact details during the period of such absence.

10.1.4 Decentralization in working and grievance redressal mechanism

There is an exclusive department to address student grievances headed by a Prof. and assisted by a team of faculty. Members of the committee include:

Prof. P N Kumar (Head, Student Affairs)
Dr. Shailendra K (Prof. Students Welfare)
Dr. Janci Rani P R (Student Counsellor)
Dr. Sowndaram (Professional Counsellor)
Ms. Rajalakshmi (Professional Counsellor)
Dr. Tharani Devi (Faculty, Student Welfare)

The above members are assisted by the department student counsellors and advisors.

The following committees are also constituted for addressing faculty and student grievances involving sexual harassment and SC/ST grievance cell.

Anti-Ragging Committee

Dr.Sasangan Ramanathan	Chairperson	Dr. M.Saimurugan	Member
Dr. (Col). PN Kumar	Member	Ms. P Ambika	Member
CCWH	Member	Dr. B Rajathilagam	Member
Dr. Balajee Ramakrishnanda	Member	Dr. R Ramanathan	Member
Dr. R Gowtham	Member	Dr. S.Selva Kumar	Member

Disciplinary Committee

Dr. (Col). PN Kumar	Chairperson	Mr. D Unnikrishnan	Member
Dr. K.Bagavinar	Member	Dr. N.Harini	Member
Dr. P V Suneesh	Member	Dr. P Prakash	Member
Mr. N.Praveen Kumar	Member	Dr. A.Balasubramanian	Member
Dr. Udaya Bhaskar Reddy Ragula	Member	Mr. M.Ganesan	Member
Mr . T Rajesh Senthil Kumar	Member	Mr. N.Mohankumar	Member
Mr. A S Prakash	Member	Dr. K R M Vijaya Chandrakala	Member
Dr. B. Soundharajan	Member	Mr. M Pushparajan	Member

Women's Complaints &Redressal

Dr. K M.Mini	Chairperson	Ms K Shobana	Member
Dr. P. Supriya	Member	Dr. Sasangan Ramanathan	Member

Emergency Response Team Members

Dr. R Saravanan	Dr. K Bagavinar
Mr. S Adarsh	Dr. P.R.Janci Rani
Mr. C Arunkumar	Mr. V.V.SajithVariyer
Mr. Gopakumar	Ms. R.Arthi
Mr. Vijay Narayanan	Mr. M Ritwik
Mr. P Sivaraj	Mr. Kalidas

SC/ST Complaints & Redressal Cell.

Dr. S Mahadevan	Chairman
Dr. T Palanisamy	Member
Dr.S.Padmavathi	Member
Dr. Anju S Pillai	Member
Mr.K.Bakiaraj	Member

10.1.5 Delegation of financial powers

a. Department chairperson verifies the accuracy and validity of request for financial commitment from the department faculty. There is no ceiling for the first line of approval by the department chairperson.
b. All financial approvals/commitments, regardless of the amount are routed through the office of Dean Engineering (campus Head).
c. If the requested amount is greater than Rs. 1 Lakh, a detailed discussion is held between the Dean and the chairperson before approval.
d. >99% of the expense request has been approved in the past 5 years, up to a maximum of Rs. 50 Lakhs.

10.1.6. Transparency and availability of correct /unambiguous information in public domain

Yes. The following steps are taken to ensure accurate information dissemination to all the stake holders.

a. At the beginning of every semester, the academic calendar, time table for all classes, faculty time table and lab schedule are made available to all stake holders. This information is available to everyone from within the campus as well as from outside the campus through virtual private network.
b. Policy information, list of members of committees, upcoming events, and student grades are available in the campus intranet (link: https://intranet.cb.amrita.edu)
c. Access to library digital content is also available via the campus intranet.

10.2.1. Adequacy of budget allocation

Table B. 10.2a: Income and expenditure summary for CFY (2018-19: unaudited), CFYm1, CFYm2 and CFYm3.

Total Income in CFY (2018-19)			Actual expenditure in CFY (2018-19)			Total No. of students in CFY: 6003
Fee (Rs. Lakh)	Govt.	Other Sources (Specify)	Recurring including Salaries (Rs. Lakh)	Non-recurring (Rs. Lakh)	Special Projects/Any other, specify	Expenditure per student (Rs. Lakh)
13126.3			8614.6	1057.3		1.61

Total Income in CFYm1 (2017-18)			Actual expenditure in CFYm1 (2017-18)			Total No. of students in CFYm1: 5925
Fee (Rs. Lakh)	Govt.	Other Sources (Specify)	Recurring including Salaries (Rs. Lakh)	Non-recurring (Rs. Lakh)	Special Projects/Any other, specify	Expenditure per student (Rs. Lakh)
11445.0			8628.6	1298.1		1.67

Total Income in CFYm2 (2016-17)			Actual expenditure in CFYm2 (2016-17)			Total No. of students in CFYm2: 5693
Fee (Rs. Lakh)	Govt.	Other Sources (Specify)	Recurring including Salaries (Rs. Lakh)	Non-recurring (Rs. Lakh)	Special Projects/Any other, specify	Expenditure per student (Rs. Lakh)
10283.7			8040.5	1325.3		1.64

Total Income in CFYm3 (2015-16)			Actual expenditure in CFYm3 (2015-16)			Total No. of students in CFYm3: 5455
Fee (Rs. Lakh)	Govt.	Other Sources (Specify)	Recurring including Salaries (Rs. Lakh)	Non-recurring (Rs. Lakh)	Special Projects/Any other, specify	Expenditure per student (Rs. Lakh)
8997.1			7927.1	295.0		1.50

Table B. 10.2b: Details of the Institute level expense for CFY (2018-19: unaudited), CFYm1, CFYm2, and CFYm3 (all figures are in Rs. Lakhs).

Items	Budgeted in CFY	Actual expenses in CFY (2018-19)	Budgeted in CFYm1	Actual expenses in CFYm1 (2017-18)	Budgeted in CFYm2	Actual expenses in CFYm2 (2016-17)	Budgeted in CFYm3	Actual expenses in CFYm3 (2015-16)
Infrastructure Built-Up	111.5	113.4	1307.5	1306.8	1174.3	1173.9	886.9	885.2
Library	556.2	555.8	68.3	67.1	172.9	172.3	210.3	209.7
Laboratory Equipment	257.2	258.7	423.0	422.5	345.3	344.6	186.7	185.3
Laboratory consumables	39.6	40.4	41.2	40.3	25.2	23.8	103.6	104.2
Teaching and non-teaching staff salary	5261.0	5262.2	5225.4	5224.3	4944.0	4943.1	4384.0	4383.4
Maintenance and spares	509.5	508.1	355.6	354.8	494.6	493.9	415.5	418.7
R&D	170.1	168.7	133.0	131.5	133.0	132.4	153.2	154.3
Training and travel	104.2	102.0	1201.1	122.4	123.4	122.8	93.4	92.9
Miscellaneous expenses*	1126.8	1125.7	1372.3	1371.5	1112.8	1111.7	1043.5	1044.0
Others, specify**	1538.3	1536.9	886.0	885.1	846.3	847.1	743.8	744.3
Total	9674.40	9671.90	11013.40	9926.30	9371.80	9365.60	8220.90	8222.00

*includes charges related to Advertisement/Publicity/Affiliation, Staff welfare expenses etc.
**includes charges related to school level software licenses, scholarship, operational and administrative expenses, vehicle, AC, security, etc.

The yearly budget is prepared based on the academic and research requirements of the departments. Budget discussion is held at the department level headed by the chairperson. A formal budget is submitted to the Dean for review. Dean will consolidate the campus level budget and submit to management for approval and sanction. Predominantly, the management approves the final budget submitted by the Dean. For the past 4 years (including the current financial year), the allocated budget and utilization have been adequate (refer to Tables B. 10.2a and 10.2b)

10.2.2 Utilization of allocated funds

Individual department chairpersons are notified regarding the sanctioned budget. Expenses for infra-structure, maintenance and house-keeping are maintained at the University/campus level, while the departments are responsible for expenses related to lab equipment, consumables, travel and training expense etc. Library expense is approved and maintained by the Dean/Principal. The sanctioned budget was effectively utilized for the past 4 years (refer to Tables B.10.2a and 10.2b).

10.2.3 Availability of the audited statements on the Institute's website

Yes

10.3. Program Specific Budget Allocation and Utilization for the Department of Chemical Engineering and Materials Science:

Table B. 10.3a: Current financial year (CFY 2018-19 unaudited), CFYm1, CFYm2 and CFYm3. All figures are in Rs. Lakhs.

Total Budget in CFY: 2018-19		Actual expenditure in CFY (2018-19)		Total No. of students in CFY: 257
Non-Recurring	Recurring	Non-Recurring	Recurring	Expenditure per student
29.50	362.5	28.65	360.3	1.51

Total Budget in CFYm1: 2017-18		Actual expenditure in CFYm1: 2017-18		Total No. of students in CFYm1: 270
Non-Recurring	Recurring	Non-Recurring	Recurring	Expenditure per student
63.00	384.0	62.61	382.5	1.65

Total Budget in CFYm2: 2016-17		Actual expenditure in CFYm2: 2016-17		Total No. of students in CFYm2: 265
Non-Recurring	Recurring	Non-Recurring	Recurring	Expenditure per student
63.50	353.60	62.66	352.4	1.57

Total Budget in CFYm3: 2015-16	Actual expenditure in CFYm3: 2015-16	Total No. of students in CFYm3: 244

Non-Recurring	Recurring	Non-Recurring	Recurring	Expenditure per student
49.60	290.3	48.97	291.4	1.39

Table B. 10.3b: Current financial year (CFY 2018-19 unaudited), CFYm1, CFYm2 and CFYm3. All figures are in Rs. Lakhs.

Items	Budgeted in CFY	Actual expenses in CFY (2018-19)	Budgeted in CFYm1	Actual expenses in CFYm1 (2017-18)	Budgeted in CFYm2	Actual expenses in CFYm2 (2016-17)	Budgeted in CFYm3	Actual expenses in CFYm3 (2015-16)
Laboratory Equipment	5.00	4.81	42.50	43.66	26.00	25.45	10.50	9.91
Software			2.00	2.05	1.00	0.86		
Laboratory consumables	1.75	1.73	2.00	1.83	1.30	1.11	5.20	4.66
Maintenance and spares	22.50	21.75	17.50	16.17	23.50	22.99	19.00	18.73
R&D	8.00	7.22	6.00	5.99	6.00	6.16	7.00	6.90
Training and travel	4.50	4.37	6.00	5.58	6.00	5.71	4.30	4.15
Miscellaneous expenses*	49.50	48.19	63.50	62.50	52.00	51.74	47.50	46.69
Total	**91.25**	**88.07**	**139.5**	**137.78**	**115.80**	**114.02**	**93.50**	**91.04**

*includes expenses related to department administration, staff welfare, guest lectures, affiliation etc.

10.3.1 Adequacy of budget allocation

The allocated budget was used to meet the requirements of purchase of new equipment, additional infrastructure needs, replacement and upgrade of old equipment, consumables for smooth operation of labs, and travel for conferences, workshops and faculty development programs. Spending of sanctioned amount is closely monitored by the department chairperson, Dean and accounts department. Tables B.10.3a and 10.3b show the budget allocation by management was adequate for the smooth functioning of the department in the past 4 years (including the financial year ending March 2019).

10.3.2 Utilization of allocated funds

The department chairperson is informed about the sanctioned budget prior to the beginning of the next financial year. Expenses related to the purchase of new equipment, software, laboratory consumables, repair/maintenance of lab equipment and travel are the responsibility of the department chairperson. Expense related requests

are considered on a case by case basis and approved by Dean. Sanctioned budget was adequately managed over the last 4 years as seen in Tables B.10.3a and 10.3b.

10.4. Library and Internet (20)

10.4.1. Quality of learning resources (hard/soft) (10)

1. Relevance **of available learning resources including** e- resources

E-Resources	
e-Books	16434
e-Journals	14739
Databases	14
DVD/CD	5307
Dissertations	3797
Print Resources	
Books	67235
Periodicals	265

List of Databases

Sno	Database
1	ACM
2	ASCE
3	ASME
4	Access Engineering
5	ASTM
6	EBSCO: CMMC
7	IEEE Xplore
8	J-Gate (JET)
9	JSTOR
10	Science Direct
11	Scopus
12	Web of Science
13	Springer eJournals
14	Springer eBooks

2. **Accessibility to students**

- Fully Automated Library with LAN and Wi-Fi connection for accessing e-Resources and Internet
- Library is arranging orientation and Hands-on-training to all students.
- Working hours - 8 am to 10 pm
- All e-resources accessible across the campus through WiFi
- Digital Library with Ethernet, UPS connectivity, seating capacity of 170
- WEB OPAC
- Institutional Repository (Soft copy of Ph.D Theses, Dissertation, Project reports, Examination papers)
- New Arrival Bulletin

3.Support to **students for** self learning **activities**

1. NPTEL
2. National Digital Library
3. Swayam Prabha,
4. e-PG Pathsala, Swayam,
5. South Asian Archive
6. EDX
7. UGC MOOCs
8. National Academy Repository
9. VIDYA Digital Library
10. World eBook Library

10.4.2. Internet

- Name of the Internet bandwith with provider

1 Gbps NKN Link - BSNL
100 Mbps - BSNL
80 Mbps - Blu Ultraband

- Wi Fi availability: WiFi is available at all Academic Areas, Library and Hostels. All students can access the WiFi using their own username and password.

- Internet access in labs, classrooms, library and offices of all Departments: Internet can be accessed from all labs, library, offices, departments etc. Network connectivity is also provided in all classrooms with internet. This connectivity is through LAN cables over and above the WiFi connectivity provided. All the buildings are interlinked through high speed fibre cable with High Bandwidth connectivity.

- Security arrangements : Network security is provided using a perimeter security device and also at all end points. At the perimeter a dual firewalling solution with Basic Firewalling features, Content/Application Filtering, Bandwidth Management, Global VPN, Gateway Antivirus, Botnet Filter, Intrusion Prevention, Anti-Spyware, Geo IP Filtering and Failover Load Balancing take care of all traffic that comes into the campus and going out of the campus. At all end points, desktops are installed

PART C: DECLARATION BY THE INSTITUTION

Annexures

Annexure B1.2: POs and PSOs

Program Outcomes (POs):

The Programme Outcomes as defined by the National Board of Accreditation are listed below.

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. **Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs) of the B.Tech Chemical Engineering program:

The undergraduate chemical engineering graduates will be able to:

1. **Fundamentals:** obtain, apply, and demonstrate knowledge of core concepts and principles associated with chemical engineering unit operations and unit processes, along with the associated ethics, economics, safety, and sustainability aspects required to work in manufacturing, service, and R&D sectors,
2. **Problem formulation and solving:** formulate chemical engineering problems, and then apply computational and simulation tools to solve them for effective, efficient, and sustainable design, operation, and optimization of chemical processes, while being socially and environmentally responsible, and
3. **Design and Analysis:** plan, design and conduct scientific experiments, analyse the data, apply critical thinking to make valid inferences, and prepare technical and scholarly reports that include management and economics.

Annexure B.2.2.5 Internship Feedback Form

Industrial Internship/Training / Visit Feedback

Name:		
Roll No.:		Semester:
Name & Address of the Industry/Organization/Company:		
Period of Training/Internship	From:	To:
Title/Short description of the Industrial Training/Internship:		
Whether report has been submitted:	Yes / No	

Put [Symbol] **mark in appropriate cells**

	5	**4**	**3**	**2**	**1**
Evaluate the training/ internship programme **Scale: 1- Poor; 2- Average; 3- Good; 4- Very Good; 5- Excellent**					
Relevance of the industrial training/ internship with the curriculum					
Access to different facilities of interest - for observation, gather data and get your clarifications					
Hospitality of the industry (Food / refreshments & accommodation / willingness to help you for any problems faced during the period)					
Overall usefulness of the industrial training/ internship					

	Design	Analysis	Development	Testing	Others
Type of Exposure given					

	Yes	No
Whether any specific official was assigned for you during the training / intern?		
Whether any relevant technical literature is obtained from the Industry?		
Was the training based on a well-defined schedule and adherence to the schedule?		
Was the opportunity given to work on real time problem or practical problem?		
Do you recommend this organization for training / internship in future?		

Signature with Date

Annexure B.3.1

Indirect Attainment – PO

Name :

Register No.:

1. Do you acquire enough engineering knowledge in the area of chemical engineering?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
2. Can you analyze the engineering problem and can provide solution to it?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
3. Can you design and develop solutions to real world problems using your engineering knowledge?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
4. Is it possible by you to conduct investigation of complex problems in chemical engineering?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
5. Can you use the modern tools like simulation software to provide engineering solutions?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
6. Is it possible by you to Apply reasoning informed by the contextual knowledge to assess
   societal, health, safety, legal and cultural issues
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
7. Can you provide engineering solutions to societal, environmental and sustainable development?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
8. Is your professional ethics improved through your engineering study?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
9. Can you work in group and can provide your contribution for multidisciplinary setting?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
10. Is your oral and written communication improved because of doing UG at Amrita?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
11. Is your project management skill and handling the finance of the project improved?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
12. Will you do the learning of chemical engineering lifelong?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
13. Have you been exposed to future technologies which will provide smart solution?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree
14. Can you do research and create innovations which will provide solution to real world problems?
   a. Strongly agree b. agree c. neutral d. disagree e. strongly disagree

Annexure B.3.2

Indirect Survey 2 – PO Attainment - Alumni

1. How would you respond to this statement. "Your Learning experience at Amrita School of Engineering was really enriching?" **[PO]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
2. I believe that the technical knowledge and skills that I gained prepared me for success in my career. [PO1]
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
3. I can apply knowledge I have through my education at Amrita to solve problems encountered in my field of work. **[PO2]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
4. I have the ability to design experiments and derive meaningful solutions. **[PO3]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
5. I have the basic skills to tackle problems of complex nature in my domain. **[PO4]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
6. I have acquired the ability to utilize the techniques, skills, modern tools and computer based technologies necessary for effectively pursuing the goals i have set in my career. **[PO5]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
7. My education helped me to render services that make people's lives better, healthier and safer. **[PO6]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
8. My education prepared me to recognize and be aware of the social, ethical and environmental impacts of my scientific and engineering activities. **[PO7]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
9. I understand and appreciate the need for integrity and ethical decision making in my professional life. **[PO8]**
   Strongly Agree, Agree Neutral Disagree, Strongly Disagree
10. I have the ability to perform services requiring individual and team efforts. **[PO9]**
    Strongly Agree, Agree Neutral Disagree, Strongly Disagree
11. I have the ability to convey effectively in matters of written and oral forms of communication. **[PO10]**
    Strongly Agree, Agree Neutral Disagree, Strongly Disagree
12. I believe that my education has provided me with necessary skills for project management and finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **[PO11]**
    Strongly Agree, Agree Neutral Disagree, Strongly Disagree
13. My education made me aware of the need for lifelong learning in my career, and the various ways in which this can be pursued. **[PO12]**
    Strongly Agree, Agree Neutral Disagree, Strongly Disagree

Annexure B.5.9 Faculty Appraisal Form

Refer Annexure B. 5 – I

Amrita SCHOOL OF ENGINEERING, Coimbatore

PERIOD: Academic Year 2017-2018

July 1, 2017 - June 30, 2018

Name: **Qualification:**

Designation: **Date of Joining Amrita:**

Department: **Date of Last Promotion:**

Employee No.

INSTRUCTIONS FOR FILLING THE FORM:

1. Enter values for **APPLICABLE CATEGORIES ONLY**

2. Journals and Conference proceedings without impact factor (IF) should be entered under IF < 1.0

3. Extramural funding can be from either Govt or Industry

4. Each campus can add campus specific Admin roles not covered in this form - subject to School Head and Dean's approval

5. Publications - Copy and paste additional rows depending on the number of publications to be entered
6. Campus specific tasks/events - School Heads can add additional rows for tasks/events specific to their campus and assign appropriate points
7. Tasks completed by faculty, but not listed in the form can be added and discussed with Chairperson and brought to the attention of the School Head

	Points per count	Category	Count	No. of Amrita faculty as co-authors	Impact Factor (IF)	Total Points	REMARK
A		**TEACHING-EVALUATION ACTIVITIES**					
A1	80	UG Theory course and evaluation (4 credit course)				0	Enter no. of theory courses handled under "count"
A2	60	UG Theory course and evaluation (3 credit course)				0	Enter no. of theory courses handled under "count"
A3	40	UG Theory course and evaluation (2 credit course)				0	Enter no. of theory courses handled under "count"
A4	80	PG Theory courses (4 credits)				0	Enter no. of theory courses handled under "count"
A5	60	PG Theory courses (3 credits)				0	Enter no. of theory courses handled under "count"
A6	30	Faculty in charge of lab (UG/PG)				0	Enter no. of labs the faculty is in charge of
A7	30	UG/PG Lab course (2 credits)				0	Enter no. of lab courses handled under "count"
A8	15	UG Project Guide (per batch)				0	Enter no. of UG batches under "count"

A9	15	UG Project Review committee member				0	Enter "1" if you are a member of review committee
A10	20	PG Project Guide				0	Count = No. of PG scholars being guided
A11	15	PG Project Review committee member				0	Enter "1" if you are a member of review committee
A12	25	Ph.D. Thesis Advisor (Post-comprehensive)				0	No of Ph.D. scholars in reasarch phase being guided
A13	10	Doctoral Committee member				0	Count = Member of no. of doctoral committee's
		SUB-TOTAL				0	
B		**RESEARCH & CONSULTANCY ACTIVITIES**					
B.1							
B.2	40	No. of Research Proposals Submitted : PI or Co-PI				0	Only final submission with Registrar approval
B.3	60	No. of extramural funded projects sanctioned (< 25 Lakhs) - PI or Co-PI				0	Applicable during the year the grant was sanctioned
B.4	90	No. of extramural funded research projects sanctioned (25 - 75 Lakhs) - PI or Co-PI				0	Applicable during the year the grant was sanctioned
B.5	150	No. of extramural funded research projects sanctioned (> 75 lakhs) - PI or Co-PI				0	Applicable during the year the grant was sanctioned
B.6	60	Extramural Research Project Execution - < Rs. 25 Lakhs (PI or Co-PI)				0	Enter no. of active projects being executed during the year of evaluation
B.7	100	Extramural Research Project Execution - > Rs. 25 Lakhs (PI or Co-PI)				0	Enter no. of active projects being executed during the year of evaluation
B.8	50	No. of peer reviewed scopus indexed publications (International Journals): **IF < 1.0**		2	1	0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.9	40	No. of peer reviewed scopus indexed publications (National Journals): **IF < 1.0**		3	1	0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.10	30	No. of scopus indexed conference proceedings publications: **IF < 1.0**		4	1	0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.11	70	No. of peer reviewed scopus indexed publications (International Journals): **IF = 1.1 - 3.0**		2		0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.12	60	No. of peer reviewed scopus indexed publications (National Journals): **IF = 1.1 - 3.0**		2		0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.13	50	No. of scopus indexed conference proceedings publications: **IF 1.1 - 3.0**		2		0	UG/PG/Ph. D. students **NEED**

							NOT be counted as co-authors.
B.14	80	No. of peer reviewed scopus indexed publications (International Journals): **IF = > 3.0**		2		0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.15	70	No. of peer reviewed scopus indexed publications (National Journals): **IF = > 3.0**		2		0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.16	60	No. of scopus indexed conference proceedings publications: **IF > 3.0**		3		0	UG/PG/Ph. D. students **NEED NOT** be counted as co-authors.
B.17	10	No. of citations of your publications with **"AMRITA Affiliation"** from "scopus.com" between **Jan 2017 - Dec 2017**				0	Count = No. of citations with Amrita affiliation. Print out of the citations summary page from scopus.com is needed.
B.18	80	No. of Books authored/co-authored (International Publisher)				0	
B.19	60	No. of Books authored/co-authored (National Publisher)				0	
B.20	50	No. of Books chapters authored/co-authored (International Publsiher)				0	
B.21	40	No. of Books chapters authored/co-authored (National Publsiher)				0	
B.22	80	Patents Filed				0	
B.23	120	Patents Granted				0	
B.24	50	International Conference conducted by Amrita (Chair or Co-chair)				0	
B.25	30	International Conference conducted by Amrita (Coordinator/member)				0	
		SUB-TOTAL				0	
C		**AWARDS and RECOGNITIONS**					
C.1	60	Invited Speaker/Chair in an International Conference (Outside India)				0	Copy of Program schedule details required
C.2	40	Invited Speaker/Chair in an International Conference (Within India)				0	Copy of Program schedule details required
C.3	200	International recognition by an Association/Society				0	Association HQ should be outside India
C.4	100	National Recognition by an Association/Society				0	Well known & establsihed Nation al Association
C.5	100	Members of faculty in-charge of a team winning National level Technical/ Cultural / Sports events				0	E.g., CISCO ideate or National/State level football champions
C.6	150	Members of faculty in-charge of a team winning International level Technical/ Cultural / Sports events				0	E.g.,ICPC champions , International competition held outside India
		SUB-TOTAL				0	

D		**DEPARTMENTAL ACTIVITIES**					
D.1	100	Vice Chair (Dept faculty strength > 40)				0	
D.2	80	Vice Chair (Dept faculty strength < 40)				0	
D.3	30	Year / Batch Coordinator				0	
D.4	40	Class Advisor				0	PG Coordinator use this
D.5	40	Class/student Counselor				0	Department counselor only
D.6	20	Dept Timetable Coordinator				0	Count = 1 per semester
D.7	60	Dept NAAC / IQAC coordinator				0	NAAC is once in 4 years and IQAC every year
D.8	80	Dept Academic Coordinator (points for handling student strength of 240)				0	Count = Actual student strength handled/240
D.9	20	Course Mentor				0	Count = No. of courses as mentor
D.10	30	Course Chief Mentor				0	Count = No. of courses as chief mentor
D.11	20	Dept AUMS Coordinator				0	
D.12	30	FDP/worlshop Organizer/Coordinator				0	Approval letter by Dean.
D.13	30	UG admissions coordinator				0	Counseling only (June 2018)
D.14	30	PG admissions coordinator				0	
D.15	30	Ph.D. admissions coordinator				0	
D.16	15	Dept Placement Coordinator				0	
D.17	100	Live in Labs Coordinator/member (per project)				0	
D.18	100	International Collaboration (Industry/Academia)				0	Project Collaboration Copy of MoU req.
D.19	60	National Collaboration (Industry/Academia)				0	Project Collaboration Copy of MoU req.
D.20	20	TAG Lead				0	Provide atleast 3 minutes of TAG meeting / Semester
D.21	50	Chairman of Amrita Vishwa Vidyapeetham BoS (UG/PG)				0	Enter 1, if chairman of either UG or PG. Enter 2, if chairman of both
D.22	30	Member of Amrita Vishwa Vidyapeetham BoS (UG/PG)				0	Enter 1, if chairman of either UG or PG. Enter 2, if chairman of both
		SUB-TOTAL				0	
E		**CAMPUS/UNIV ADMINISTRATIVE ACTIVITIES**					
E.1	150	Head, Student Affairs				0	Enter 1 under "count", if applicable
E.2	100	Head, Research				0	Enter 1 under "count", if applicable
E.3	150	Campus Academic Coordinator				0	Enter 1 under "count", if applicable

E.4	150	Campus Dy Controller of Examination				0	Enter 1 under "count", if applicable
E.5	60	Campus IQAC Coordinator				0	Enter 1 under "count, if applicable
E.6	20	Campus Time Table Coordinator				0	**Count = 1 per semester**
E.7	100	Campus AUMS Coordinator				0	Enter 1 under "count, if applicable
E.8	30	Campus/School level event Coordinator (Cultural; Technical and Sports)				0	Enter total no. of events coordinated
E.9	20	Campus/School level event Member (Cultural; Technical and Sports)				0	Enter total no. of events coordinated
E.10	30	Campus Level Committee Chair (e.g., mess, hostel, disciplinary etc)				0	Count = no. of committees being chaired
E.11	30	Campus level Committee Member (e.g, mess, hostel, disciplinary, etc)				0	Count = member of no. of committees Chair is also a member
E.12	150	Univ NAAC / IQAC coordinator				0	
		SUB-TOTAL				0	
		GRAND TOTAL				**0**	

General Guideline (only for reference and need not be printed as part of submission of this form)

Select print area and exclude this section from the selected print area to avoid printing this section

Publication
Only published papers will be counted towards publication.
A copy of just the first page of the publication to be attached as proof of publication.
Publications from Jul 1, 2017 - Jun 30, 2018 will be counted towards this review period
Papers submitted for publication and not yet published will not be counted as publication for this review period

Citations
Citations - include the total no. of citations with Amrita affiliation from scopus.com
A print out of the summary page from scopus.com is sufficient. Citation period: Jan - Dec 2016 for this review period

Funded projects
A copy of the first page with Regiistrar's signature can be attached as proof of submission
A copy of the official email or letter from funding agencies can be attached as proof of sanctioned projects
Extramural funding includes funding from the Govt and Industry. Does not include the seed grant received from Amrita Vishwa Vidyapeetham

Administration
Each campus may have different administrative process and depending on the administrative process
School Heads/Directors can add additional line items that pertain to administrative work not captured in the form
School Heads/Directors can decide on the points normalized to the points assigned for a 3 credit course (60 points)

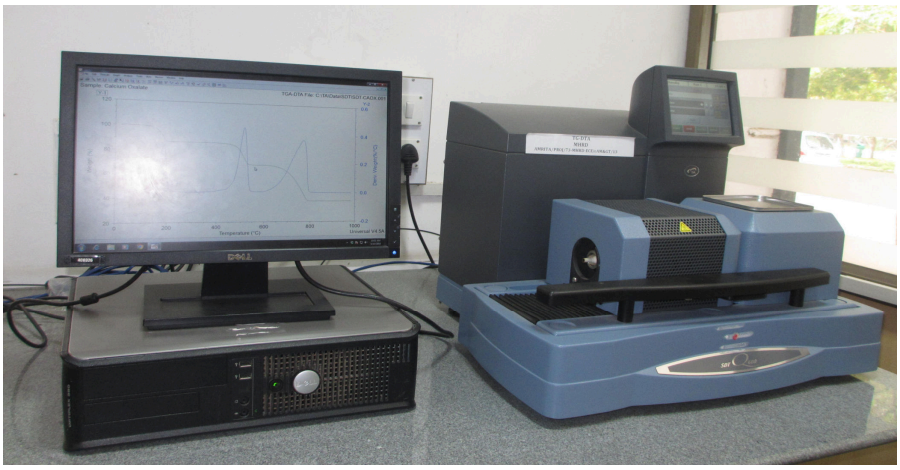
Miscellaneous
If there are achievements/tasks performed that are not captured, add them as separate line item and appropriate points can be assigned by the School Head/Director

Printing
Print double sided for submission to Chairperson and/or School Head

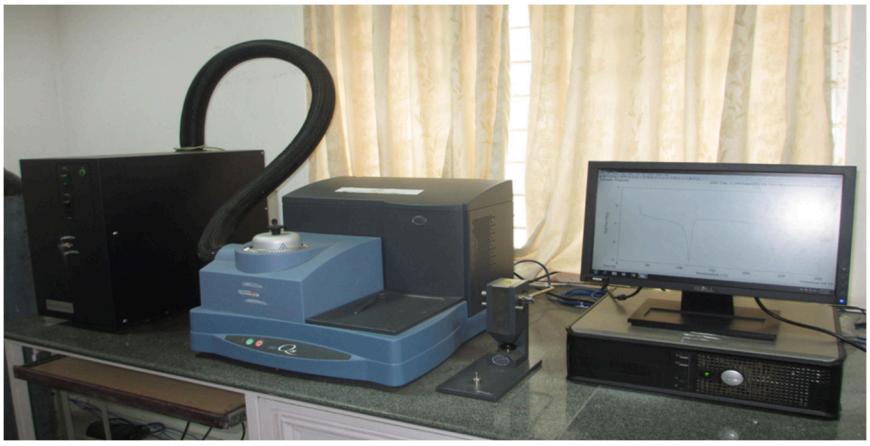
Annexure B 6.4: Project Laboratories and Facilities

Fourier Transform Infrared spectrometer (Thermofisher, USA- Nicolet iS10)

Gas chromatography mass spectrometer (Schimadzu, Japan -QP2010)

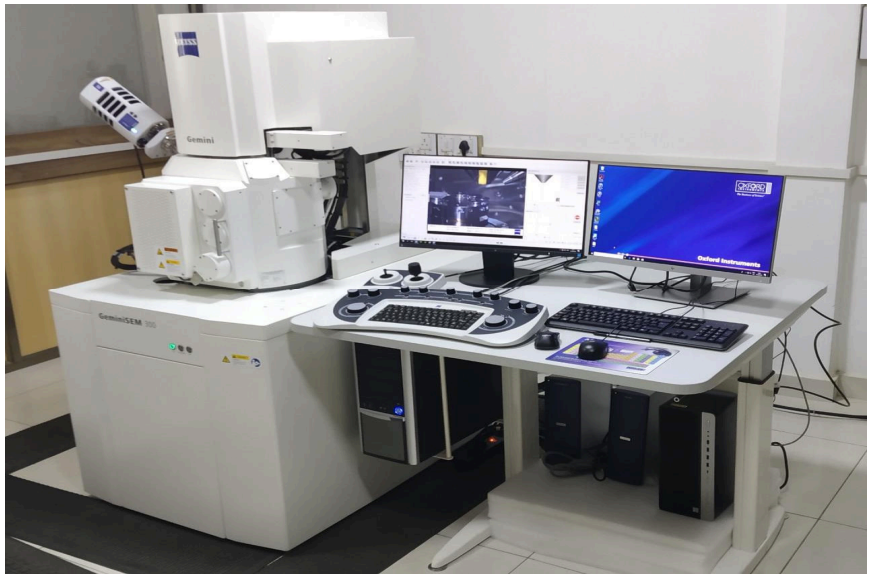


Thermo gravimetric differential thermal analyzer (TA Instruments, USA- SDT Q600)



Differential scanning calorimeter (TA Instruments, USA-DSC Q20)

X-ray Diffractometer (Rigaku ,Japan- Ultimate IV)



Field emission scanning electron microscope (Carl Zeiss ,Germany- Gemini SEM 300)

Equipments in Polymer Nanocomposites Lab

Electrochemical Potentiostat/Galvanostat (Zive SP)

Annexure B 9.2 : Faculty Feedback Matrix

Q.No	Questions	Options
Q1	Knowledge of the teacher in the subject.	Excellent
		Good
		Fair
		Poor
		Unable to Judge
Q2	Clarity and understandability of teacher's explanations.	Excellent
		Good
		Fair
		Poor
		Unable to Judge
Q3	Teacher's willingness to help the students.	Excellent
		Good
		Fair
		Poor
		Unable to Judge
Q4	Approximate percentage of classes not engaged by the teacher in the subject.	Less than 10%
		10% to 25%

Q.No	Questions	Options
		More than 25%
		Unable to judge
Q5	Whether the teacher dictates notes only without explanations?	Yes
		No
		Unable to Judge
Q6	Teacher's ability to organize lectures.	Excellent
		Satisfactory
		Inadequate
		Unable to Judge
Q7	Speed of presentation.	Just Right
		Too Fast
		Too Slow
		Unable to Judge
Q8	Behavior of the teacher.	Pleasant
		Indifferent
		Unpleasant
		Unable to Judge
Q9	Does the teacher encourage questioning?	No
		sometimes
		Yes
		Unable to Judge

Q.No	Questions	Options
Q10	Sincerity of the teacher.	sincere
		Not Sincere
		Unable to Judge
		Do not want to answer
Q11	Overall teaching effectiveness	Excellent
		Good
		Fair
		Poor
		Unable to Judge

Annexure B 8.5.2 : Process for arriving at PO attainment

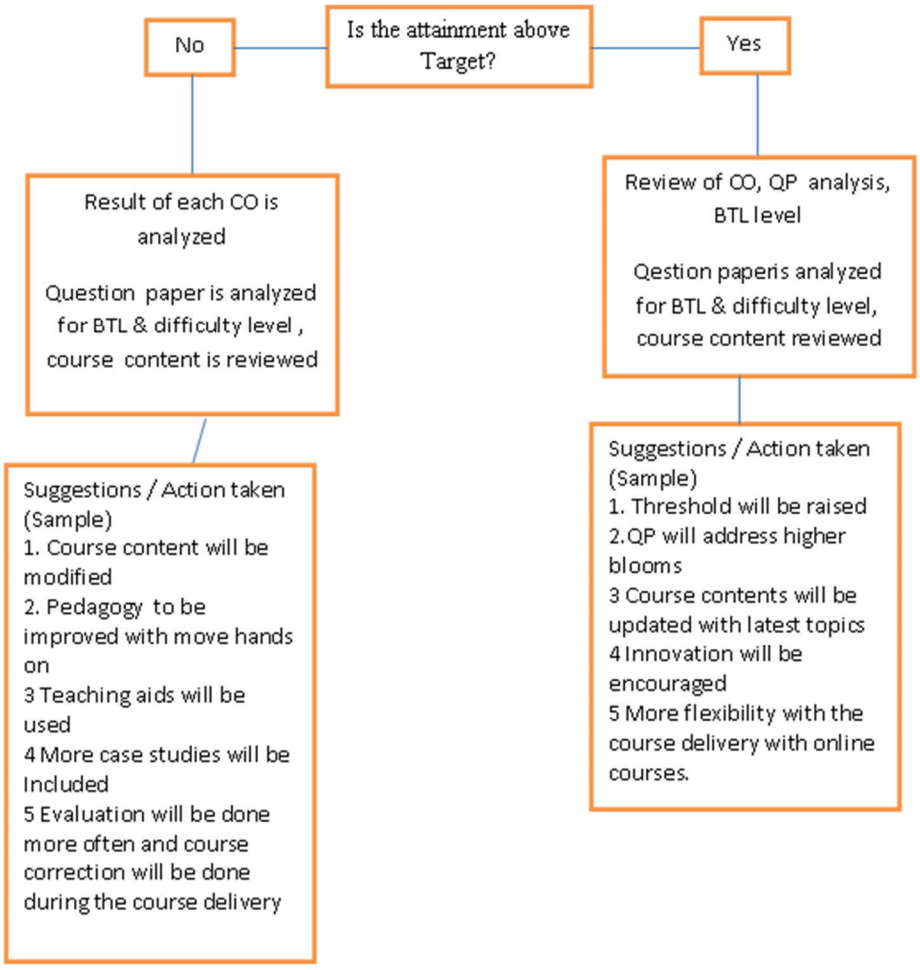
Process for arriving at PO attainment and action taken for criteria 8.5.2& Criteria 7.1

1. Course outcomes attainment is calculated for every course in the following manner.
a. Threshold of 50% is assigned for all theory courses and 70% for lab courses
b. The number of students who have scored more than the threshold (50%) is counted for arriving at the course outcome and percentage of students who have crossed the threshold will contribute to the course attainment (CO)
2. The weightage given to periodical test 1 and periodical test 2 and continuous assessment is 50% and that of End semester is 50%
3. This is converted to a weightage of 80 % and a 20% weightage is assigned to course exit survey
4. Programme outcomes attainments (PO) are arrived at by the following procedure
a. If a course is delivered to multiple sections average of the CO attainment is taken.
b. Percentage co-attainment is converted with level using the following logic

% attainment	Level
0-40	1
40-60	2
Above 60	3

c. Using the PO articulation Matrix a target value for PO attainment is arrived at by taking a weightage average.

Action taken is based on the following flow chart



Annexures B.9: Available for Inspection at the Institute

Annexures related to Criterion B9 have not been included in the SAR report. The same are available at the institute for inspection.

AMRITA VISHWA VIDYAPEETHAM | School of Engineering

Amritapuri
Bengaluru
Coimbatore

Amritanagar P. O., Ettimadai, Coimbatore - 641 112 Tamil Nadu, INDIA. Ph: +91 422 2685000 Fax: +91 422 2686274 E-mail : ase@amrita.edu

Declaration

I undertake that, the institution is well aware about the provisions in the NBA's accreditation manual concerned for this application, rules, regulations, notifications and NBA expert visit guidelines in force as on date and the institute shall fully abide by them.

It is submitted that information provided in this Self-Assessment Report is factually correct. I understand and agree that an appropriate disciplinary action against the Institute will be initiated by the NBA in case any false statement/information is observed during pre-visit, visit, post visit and subsequent to grant of accreditation.

Signature and Name
Head of the Institution with seal

Date: April 26, 2019

Place: Coimbatore

DR.SASANGAN RAMANATHAN
Dean (Engineering)
Amrita Vishwa Vidyapeetham
Amrita Nagar, Coimbatore - 641 112.