



AMRITA
VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY

School of
Engineering

(AMRITAPURI, BANGALORE, COIMBATORE, CHENNAI)

**B.Tech. in COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE)**

(BTC-AIE)

CURRICULUM 2019

SEMESTER 1

| Cat. | Code | Title | L T P | Credit |
|-------------|-------------|--|--------------|---------------|
| SCI | 19MAT105 | Mathematics for Intelligent Systems 1 | 2 0 3 | 3 |
| SCI | 19PHY104 | Computational Engineering Mechanics 1 | 2 0 3 | 3 |
| ENGG | 19AIE105 | Object Oriented Programming | 2 1 3 | 4 |
| ENGG | 19AIE101 | Elements of Computing Systems 1 | 2 0 3 | 3 |
| ENGG | 19AIE104 | Introduction to Electrical Engineering | 2 0 3 | 3 |
| SCI | 19BIO103 | Intelligence of Biological Systems 1 | 1 0 3 | 2 |
| ENGG | 19AIE102 | Introduction to Digital Manufacturing | 1 0 3 | 2 |
| ENGG | 19AIE103 | Introduction to Drones | 1 0 3 | 2 |
| HUM | 19CUL101 | Cultural Education I | 2 0 0 | 2 |
| | | TOTAL | 28 | 24 |

SEMESTER II

| Cat. | Code | Title | L T P | Credit |
|-------------|-------------|---------------------------------------|--------------|---------------|
| SCI | 19MAT117 | Mathematics for Intelligent Systems 2 | 2 0 3 | 3 |
| SCI | 19PHY113 | Computational Engineering Mechanics 2 | 2 0 3 | 3 |
| ENGG | 19AIE114 | Principles of Measurements & Sensors | 1 1 3 | 3 |
| ENGG | 19AIE111 | Data Structures & Algorithms 1 | 2 1 3 | 4 |
| ENGG | 19AIE112 | Elements of Computing Systems - 2 | 2 0 3 | 3 |
| ENGG | 19AIE113 | Introduction to Electronics | 2 0 3 | 3 |
| SCI | 19BIO112 | Intelligence of Biological Systems 2 | 1 0 3 | 2 |
| HUM | 19CUL111 | Cultural Education II | 2 0 0 | 2 |
| HUM | 19ENG111 | Technical Communication | 2 0 3 | 3 |
| | | TOTAL | 28 | 26 |

SEMESTER III

| Cat. | Code | Title | L T P | Credit |
|-------------|-------------|---------------------------------------|--------------|---------------|
| SCI | 19MAT204 | Mathematics for Intelligent Systems 3 | 2 0 3 | 3 |
| ENGG | 19AIE201 | Introduction to Robotics | 1 2 0 | 3 |
| ENGG | 19AIE202 | Operating Systems | 2 1 3 | 4 |
| ENGG | 19AIE203 | Data Structures & Algorithms 2 | 2 1 3 | 4 |
| ENGG | 19AIE204 | Introduction to Communication Systems | 1 2 0 | 3 |
| ENGG | 19BIO201 | Intelligence of Biological Systems 3 | 1 2 0 | 3 |
| ENGG | 19AIE205 | Python for Machine Learning | 0 0 3 | 1 |
| HUM | 19LAW300 | Indian Constitution | | P/F |
| HUM | 19AVP201 | Amrita Values Program-1 | 1 0 0 | 1 |
| | | TOTAL | 28 | 22 |

SEMESTER IV

| Cat. | Code | Title | L T P | Credit |
|-------------|-------------|--|--------------|---------------|
| SCI | 19MAT212 | Mathematics for Intelligent Systems 4 | 2 0 3 | 3 |
| ENGG | 19AIE211 | Introduction to Computer Networks | 2 0 3 | 3 |
| ENGG | 19AIE212 | Design and Analysis of Algorithms | 2 0 3 | 3 |
| ENGG | 19AIE213 | Robotic Operating Systems & Robot Simulation | 2 0 3 | 3 |
| ENGG | 19AIE214 | Bigdata Analytics | 2 0 3 | 3 |
| ENGG | 19BIO211 | Intelligence of Biological Systems 4 | 1 2 0 | 3 |
| HUM | 19AVP211 | Amrita Values Program-2 | 1 0 0 | 1 |
| HUM | 19ENV300 | Environmental Science | | P/F |
| HUM | 19SSK211 | Soft Skills I | 1 0 2 | 2 |
| | | TOTAL | 26 | 21 |

SEMESTER V

| Cat. | Code | Title | L T P | Credit |
|------|----------|--|-----------|-----------|
| SCI | 19MAT301 | Mathematics for Intelligent Systems 5 | 2 0 3 | 3 |
| ENGG | 19AIE301 | Formal language and Automata | 2 0 3 | 3 |
| ENGG | 19AIE302 | Advanced Computer Networks | 2 0 3 | 3 |
| ENGG | 19AIE303 | Signal & Image Processing | 2 0 3 | 3 |
| ENGG | 19AIE304 | Big Data and Database Management | 2 0 3 | 3 |
| ENGG | | Professional Elective 1*/Live-in Labs*** | 2 1 0 | 3 |
| HUM | 19SSK301 | Soft. Skills II | 1 0 2 | 2 |
| HUM | 19MNG300 | Disaster Management | | P/F |
| | | TOTAL | 23 | 20 |

SEMESTER VI

| Cat. | Code | Title | L T P | Credit |
|------|----------|---|-----------|-----------|
| SCI | 19MAT311 | Mathematics for Intelligent Systems 6 | 2 0 3 | 3 |
| ENGG | 19AIE311 | Reinforcement Learning | 2 0 3 | 3 |
| ENGG | 19AIE312 | Deep Learning for Signal & Image Processing | 2 0 3 | 3 |
| ENGG | 19AIE313 | Introduction to Modern Compiler Design | 2 0 0 | 2 |
| ENGG | | Professional Elective 2*/Live in labs *** | 1 2 0 | 3 |
| ENGG | 19AIE314 | AI in Natural Language Processing | 2 0 3 | 3 |
| ENGG | 19AIE315 | AI in Speech Processing | 2 0 3 | 3 |
| HUM | 19SSK311 | Soft Skills II | 1 0 2 | 2 |
| | | TOTAL | 25 | 22 |

SEMESTER VII

| Cat. | Code | Title | L T P | Credit |
|------|----------|-----------------------------|-----------|-----------|
| ENGG | 19AIE401 | Deep Reinforcement Learning | 1 2 0 | 3 |
| ENGG | | Professional Elective 3* | 2 1 0 | 3 |
| ENGG | | Professional Elective 4* | 2 1 0 | 3 |
| ENGG | | Free Elective 1** | 2 0 0 | 2 |
| ENGG | | Free Elective 2** | 2 0 0 | 2 |
| ENGG | 19AIE495 | Mini Project | 0 0 6 | 2 |
| | | TOTAL | 18 | 15 |

SEMESTER VIII

| Cat. | Code | Title | L T P | Credit |
|------|----------|--------------|-----------|-----------|
| PRJ | 19AIE499 | Dissertation | 0 0 30 | 10 |
| | | TOTAL | 30 | 10 |

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|--|--|---------------|-----|--|
| | | Total Credits | 160 | |
|--|--|---------------|-----|--|

***Professional Elective** - Electives categorised under Engineering, Science ,Mathematics, Live-in-Labs, and NPTEL Courses . Student can opt for such electives across departments/campuses.Students with CGPA of 7.0 and above can opt for a maximum of 2 NPTEL courses with the credits not exceeding 8.

**** Free Electives** - This will include courses offered by Faculty of Humanities and Social Sciences/ Faculty Arts, Commerce and Media / Faculty of Management/Amrita Darshanam -(International Centre for Spiritual Studies).

***** Live-in-Labs** - Students undertaking and registering for a Live-in-Labs project, can be exempted from registering for an Elective course in the higher semester.

PROFESSIONAL ELECTIVES

| Pool 1: AI in Cyber Security | | | | |
|-------------------------------------|-------------|--|--------------|---------------|
| Cat. | Code | Title | L T P | Credit |
| ENGG | 19AIE431 | Applied Cryptography | 1 2 0 | 3 |
| ENGG | 19AIE432 | Network and Wireless Security | 1 2 0 | 3 |
| ENGG | 19AIE433 | Intrusion Detection and Prevention Systems | 1 2 0 | 3 |
| ENGG | 19AIE434 | Software Vulnerability Analysis | 1 2 0 | 3 |
| ENGG | 19AIE435 | Cybercrime Forensics and Digital Forensics | 1 2 0 | 3 |
| ENGG | 19AIE436 | Distributed System Security | 1 2 0 | 3 |

| Pool 2: AI in Healthcare | | | | |
|---------------------------------|-------------|---|--------------|---------------|
| Cat. | Code | Title | L T P | Credit |
| ENGG | 19AIE451 | Computational Healthcare | 1 2 0 | 3 |
| ENGG | 19AIE452 | Basics of Drug Design | 1 2 0 | 3 |
| ENGG | 19AIE453 | Deep learning in Genomics and Biomedicine | 1 2 0 | 3 |
| ENGG | 19AIE454 | Clinical Information Systems | 1 2 0 | 3 |
| ENGG | 19AIE455 | CRISPR Technology | 1 2 0 | 3 |
| ENGG | 19AIE456 | DNA Sequencing | 1 2 0 | 3 |

| Pool 3: AI in Robotics | | | | |
|-------------------------------|-------------|--------------------------------------|--------------|---------------|
| Cat. | Code | Title | L T P | Credit |
| ENGG | 19AIE441 | Kinematics and Kinetics for Robotics | 1 2 0 | 3 |
| ENGG | 19AIE442 | Robotics Vision | 1 2 0 | 3 |
| ENGG | 19AIE443 | Dynamics and Control of Robotics | 1 2 0 | 3 |
| ENGG | 19AIE444 | Sensors for Robotics | 1 2 0 | 3 |
| ENGG | 19AIE445 | Application of Robotics | 1 2 0 | 3 |

PROFESSIONAL ELECTIVES UNDER SCIENCE STREAM

| CHEMISTRY | | | | |
|------------------|-------------|---|--------------|---------------|
| Cat. | Code | Title | L T P | Credit |
| SCI | 19CHY243 | Computational Chemistry and Molecular Modelling | 3 0 0 | 3 |
| SCI | 19CHY236 | Electrochemical Energy Systems and Processes | 3 0 0 | 3 |
| SCI | 19CHY240 | Fuels and Combustion | 3 0 0 | 3 |

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|--------------------|----------|--|-------|---|
| SCI | 19CHY232 | Green Chemistry and Technology | 3 0 0 | 3 |
| SCI | 19CHY239 | Instrumental Methods of Analysis | 3 0 0 | 3 |
| SCI | 19CHY241 | Batteries and Fuel Cells | 3 0 0 | 3 |
| SCI | 19CHY242 | Corrosion Science | 3 0 0 | 3 |
| PHYSICS | | | | |
| SCI | 19PHY340 | Advanced Classical Dynamics | 3 0 0 | 3 |
| SCI | 19PHY342 | Electrical Engineering Materials | 3 0 0 | 3 |
| SCI | 19PHY331 | Physics of Lasers and Applications | 3 0 0 | 3 |
| SCI | 19PHY341 | Concepts of Nanophysics and Nanotechnology | 3 0 0 | 3 |
| SCI | 19PHY343 | Physics of Semiconductor Devices | 3 0 0 | 3 |
| SCI | 19PHY339 | Astrophysics | 3 0 0 | 3 |
| MATHEMATICS | | | | |
| SCI | 19MAT341 | Statistical Inference | 3 0 0 | 3 |
| SCI | 19MAT342 | Introduction to Game Theory | 3 0 0 | 3 |
| SCI | 19MAT343 | Numerical Methods and Optimization | 3 0 0 | 3 |

FREE ELECTIVES

| FREE ELECTIVES OFFERED UNDER MANAGEMENT STREAM | | | | |
|---|-------------|--------------------------|--------------|---------------|
| Cat. | Code | Title | L T P | Credit |
| HUM | 19MNG331 | Financial Management | 3 0 0 | 3 |
| HUM | 19MNG332 | Supply Chain Management | 3 0 0 | 3 |
| HUM | 19MNG333 | Marketing Management | 3 0 0 | 3 |
| HUM | 19MNG334 | Project Management | 3 0 0 | 3 |
| HUM | 19MNG335 | Enterprise Management | 3 0 0 | 3 |
| HUM | 19MNG338 | Operations Research | 3 0 0 | 3 |
| HUM | 19MEE401 | Industrial Engineering | 3 0 0 | 3 |
| HUM | 19MEE346 | Managerial Statistics | 3 0 0 | 3 |
| HUM | 19MEE347 | Total Quality Management | 3 0 0 | 3 |

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|------------|-----------------|--------------------------------------|--------------|----------|
| HUM | 19MEE342 | Lean Manufacturing | 3 0 0 | 3 |
| HUM | 19CSE358 | Software Project Management | 3 0 0 | 3 |
| HUM | 19CSE359 | Financial Engineering | 3 0 0 | 3 |
| HUM | 19CSE360 | Engineering Economic Analysis | 3 0 0 | 3 |
| HUM | 19MNG331 | Financial Management | 3 0 0 | 3 |
| HUM | 19CSE362 | Information Systems | 3 0 0 | 3 |

| FREE ELECTIVES OFFERED UNDER HUMANITIES / SOCIAL SCIENCE STREAMS | | | | |
|---|-----------------|---|--------------|---------------|
| Cat. | Code | Title | L T P | Credit |
| HUM | 19CUL230 | Achieving Excellence in Life - An Indian Perspective | 2 0 0 | 2 |
| HUM | 19CUL231 | Excellence in Daily Life | 2 0 0 | 2 |
| HUM | 19CUL232 | Exploring Science and Technology in Ancient India | 2 0 0 | 2 |
| HUM | 19CUL233 | Yoga Psychology | 2 0 0 | 2 |
| HUM | 19ENG230 | Business Communication | 1 0 3 | 2 |
| HUM | 19ENG231 | Indian Thought through English | 2 0 0 | 2 |
| HUM | 19ENG232 | Insights into Life through English Literature | 2 0 0 | 2 |
| HUM | 19ENG233 | Technical Communication | 2 0 0 | 2 |
| HUM | 19ENG234 | Indian Short Stories in English | 2 0 0 | 2 |
| HUM | 19FRE230 | Proficiency in French Language (Lower) | 2 0 0 | 2 |
| HUM | 19FRE231 | Proficiency in French Language (Higher) | 2 0 0 | 2 |
| HUM | 19GER230 | German for Beginners I | 2 0 0 | 2 |
| HUM | 19GER231 | German for Beginners II | 2 0 0 | 2 |
| HUM | 19GER232 | Proficiency in German Language (Lower) | 2 0 0 | 2 |
| HUM | 19GER233 | Proficiency in German Language (Higher) | 2 0 0 | 2 |
| HUM | 19HIN101 | Hindi I | 2 0 0 | 2 |
| HUM | 19HIN111 | Hindi II | 2 0 0 | 2 |

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|------------|------------------|---|--------------|----------|
| HUM | 19HUM230 | Emotional Intelligence | 2 0 0 | 2 |
| HUM | 19HUM231 | Glimpses into the Indian Mind - the Growth of Modern India | 2 0 0 | 2 |
| HUM | 19HUM232 | Glimpses of Eternal India | 2 0 0 | 2 |
| HUM | 19HUM233 | Glimpses of Indian Economy and Polity | 2 0 0 | 2 |
| HUM | 19HUM234 | Health and Lifestyle | 2 0 0 | 2 |
| HUM | 19HUM235 | Indian Classics for the Twenty-first Century | 2 0 0 | 2 |
| HUM | 19HUM236 | Introduction to India Studies | 2 0 0 | 2 |
| HUM | 19HUM237 | Introduction to Sanskrit Language and Literature | 2 0 0 | 2 |
| HUM | 19HUM238 | National Service Scheme | 2 0 0 | 2 |
| HUM | 19HUM239 | Psychology for Effective Living | 2 0 0 | 2 |
| HUM | 19HUM240 | Psychology for Engineers | 2 0 0 | 2 |
| HUM | 19HUM241 | Science and Society - An Indian Perspective | 2 0 0 | 2 |
| HUM | 19HUM242 | The Message of Bhagwad Gita | 2 0 0 | 2 |
| HUM | 19HUM243 | The Message of the Upanishads | 2 0 0 | 2 |
| HUM | 19HUM244 | Understanding Science of Food and Nutrition | 2 0 0 | 2 |
| HUM | 19JAP230 | Proficiency in Japanese Language (Lower) | 2 0 0 | 2 |
| HUM | 19JAP2313 | Proficiency in Japanese Language (Higher) | 2 0 0 | 2 |
| HUM | 19KAN101 | Kannada I | 2 0 0 | 2 |
| HUM | 19KAN111 | Kannada II | 2 0 0 | 2 |
| HUM | 19MAL101 | Malayalam I | 2 0 0 | 2 |
| HUM | 19MAL111 | Malayalam II | 2 0 0 | 2 |
| HUM | 19SAN101 | Sanskrit I | 2 0 0 | 2 |
| HUM | 19SAN111 | Sanskrit II | 2 0 0 | 2 |
| HUM | 19SWK230 | Corporate Social Responsibility | 2 0 0 | 2 |
| HUM | 19SWK231 | Workplace Mental Health | 2 0 0 | 2 |
| HUM | 19TAM101 | Tamil I | 2 0 0 | 2 |
| HUM | 19TAM111 | Tamil II | 2 0 0 | 2 |