



AMRITA
VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY

School of
Engineering

(AMRITAPURI, BANGALORE, COIMBATORE, CHENNAI)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**B.Tech. in ELECTRONICS AND COMMUNICATION
ENGINEERING**

(BTC-ECE)

CURRICULUM 2019

SEMESTER I

| Cat. | Code | Title | L T P | Credit |
|------|----------|--|-------|-----------|
| SCI | 19BIO101 | Biology for Engineers -A | 3 0 0 | 3 |
| SCI | 19MAT101 | Single Variable Calculus | 1 0 0 | 1 |
| SCI | 19MAT102 | Matrix Algebra | 2 0 0 | 2 |
| ENGG | 19CSE100 | Problem Solving and Algorithmic Thinking | 2 1 3 | 4 |
| SCI | 19PHY103 | Physics of Electronic Materials | 3 0 0 | 3 |
| ENGG | 19MEE100 | Engineering Graphics - CAD | 2 0 3 | 3 |
| ENGG | 19EEE100 | Basic Electrical and Electronics Engineering | 3 0 0 | 3 |
| ENGG | 19EEE181 | Basic Electrical and Electronics Engineering Lab | 0 0 3 | 1 |
| ENGG | 19ECE101 | Introduction to Internet of Things | 0 0 3 | 1 |
| HUM | 19CUL101 | Cultural Education - I | 2 0 0 | 2 |
| | | TOTAL | | 23 |

SEMESTER II

| Cat. | Code | Title | L T P | Credit |
|------|----------|---------------------------------|-------|-----------|
| HUM | 19ENG111 | Technical Communication | 2 0 3 | 3 |
| SCI | 19MAT111 | Multivariable Calculus | 2 0 0 | 2 |
| SCI | 19MAT112 | Linear Algebra | 2 1 0 | 3 |
| SCI | 19CHY102 | Engineering Chemistry - B | 2 1 0 | 3 |
| SCI | 19CHY182 | Engineering Chemistry Lab - B | 0 0 3 | 1 |
| ENGG | 19CSE102 | Computer Programming | 3 0 3 | 4 |
| ENGG | 19ECE112 | Electronic Devices and Circuits | 3 0 0 | 3 |
| ENGG | 19ECE181 | Electronic Systems Lab | 0 0 3 | 1 |
| ENGG | 19MEE181 | Manufacturing Practice | 0 0 3 | 1 |
| ENGG | 19ECE111 | Circuit Theory | 3 0 0 | 3 |
| HUM | 19CUL111 | Cultural Education - II | 2 0 0 | 2 |
| | | TOTAL | | 26 |

SEMESTER III

| Cat. | Code | Title | L T P | Credit |
|------|----------|---|-----------|-----------|
| ENGG | 19ECE201 | Analog Electronic Circuits | 3 0 0 | 3 |
| ENGG | 19ECE202 | Applied Electromagnetics | 3 1 0 | 4 |
| ENGG | 19ECE204 | Digital Electronics and Systems | 3 1 0 | 4 |
| ENGG | 19ECE203 | Signals and Systems | 3 1 0 | 4 |
| SCI | 19MAT205 | Probability Theory and Random Processes | 3 1 0 | 4 |
| ENGG | 19ECE282 | Digital Electronics and Systems Lab | 0 0 3 | 1 |
| ENGG | 19ECE281 | Analog Electronics Lab | 0 0 3 | 1 |
| HUM | 19AVP201 | Amrita Values Program I | 1 0 0 | 1 |
| HUM | 19ENV300 | Environmental Science | | P/F |
| | | TOTAL | 25 | 22 |

SEMESTER IV

| Cat. | Code | Title | L T P | Credit |
|------|----------|--|-----------|-----------|
| ENGG | 19ECE213 | Transmission Lines and Radiating Systems | 3 1 0 | 4 |
| ENGG | 19ECE211 | Digital Signal Processing | 3 0 0 | 3 |
| ENGG | 19ECE212 | Linear Integrated Circuits | 3 0 0 | 3 |
| ENGG | 19ECE214 | Communication Theory | 3 1 0 | 4 |
| SCI | 19MAT213 | Optimization Techniques | 3 0 0 | 3 |
| ENGG | 19ECE284 | Digital Signal Processing Lab | 0 0 3 | 1 |
| HUM | 19AVP211 | Amrita Values Program II | 1 0 0 | 1 |
| ENGG | 19ECE283 | Linear Integrated Circuits Lab | 0 0 3 | 1 |
| HUM | 19SSK211 | Soft Skills I | 1 0 3 | 2 |
| HUM | 19LAW300 | Indian Constitution | | P/F |
| | | TOTAL | 27 | 22 |

SEMESTER V

| Cat. | Code | Title | L T P | Credit |
|------|----------|----------------------------------|-------|--------|
| ENGG | 19ECE304 | Microcontrollers and Interfacing | 3 0 3 | 4 |
| ENGG | 19ECE303 | Radio Frequency Engineering | 3 0 0 | 3 |
| ENGG | 19ECE302 | Digital Communication | 3 0 0 | 3 |
| ENGG | 19ECE301 | Control Theory | 3 1 0 | 4 |
| ENGG | | Professional Elective I* | 3 0 0 | 3 |
| ENGG | 19ECE381 | RF and Simulation lab | 0 0 3 | 1 |
| ENGG | 19ECE382 | Communication Systems lab | 0 0 3 | 1 |
| HUM | 19SSK301 | Soft Skills II | 1 0 3 | 2 |
| ENGG | 19LIV390 | Live-in –Labs*** | | [3] |
| | | TOTAL | 29 | 21+[3] |

SEMESTER VI

| Cat. | Code | Title | L T P | Credit |
|------|----------|-------------------------------|-------|--------|
| ENGG | 19ECE313 | VLSI Design | 3 0 0 | 3 |
| ENGG | 19ECE311 | Computer Networks | 4 0 0 | 4 |
| ENGG | 19ECE312 | Information Theory and Coding | 3 0 0 | 3 |
| ENGG | | Professional Elective II* | 3 0 0 | 3 |
| ENGG | | Professional Elective III* | 3 0 0 | 3 |
| ENGG | 19ECE383 | VLSI Design Lab | 0 0 3 | 1 |
| HUM | 19SSK311 | Soft Skills III | 1 0 3 | 2 |
| ENGG | 19ECE391 | Seminar | 0 0 3 | 1 |
| ENGG | 19ECE384 | Open Lab | 0 0 3 | 1 |
| HUM | 19MNG300 | Disaster Management | | P/F |
| ENGG | 19LIV490 | Live-in –Labs*** | | [3] |
| | | TOTAL | 29 | 21+[3] |

SEMESTER VII

| Cat. | Code | Title | L T P | Credit |
|------|----------|---------------------------|-----------|-----------|
| ENGG | | Professional Elective IV* | 3 0 0 | 3 |
| ENGG | | Professional Elective V* | 3 0 0 | 3 |
| ENGG | | Professional Elective VI* | 3 0 0 | 3 |
| HUM | | Free Elective** | 2 0 0 | 2 |
| HUM | | Free Elective** | 2 0 0 | 2 |
| PRJ | 19ECE495 | Project Phase I | 0 0 6 | 2 |
| | | TOTAL | 19 | 15 |

SEMESTER VIII

| Cat. | Code | Title | L T P | Credit |
|------|----------|----------------------------|-----------|-----------|
| ENGG | | Professional Elective VII* | 3 0 0 | 3 |
| PRJ | 19ECE499 | Project Phase II | 0 0 30 | 10 |
| | | TOTAL | 33 | 13 |

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|--|--|----------------------|--|------------|
| | | TOTAL CREDITS | | 163 |
|--|--|----------------------|--|------------|

***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 ELECTIVE

| Cat. | Code | Title | L T P | Credit |
|--|----------|---|-------|--------|
| Analog and Mixed Signal Systems | | | | |
| ENGG | 19ECE331 | Biomedical Instrumentation | 3 0 0 | 3 |
| ENGG | 19ECE332 | Mixed Signal Design | 3 0 0 | 3 |
| ENGG | 19ECE333 | Micro Electro Mechanical Systems | 3 0 0 | 3 |
| ENGG | 19ECE334 | Analog IC Design | 3 0 0 | 3 |
| ENGG | 19ECE335 | Applications of Linear Integrated Circuits | 3 0 0 | 3 |
| ENGG | 19ECE336 | Nano Electronics | 3 0 0 | 3 |
| ENGG | 19ECE337 | VLSI Fabrication Technology | 3 0 0 | 3 |
| ENGG | 19ECE338 | Solid State Devices | 3 0 0 | 3 |
| ENGG | 19ECE339 | Optical Engineering | 3 0 0 | 3 |
| Digital System design and architectures | | | | |
| ENGG | 19ECE341 | VLSI System Design | 3 0 0 | 3 |
| ENGG | 19ECE342 | Hardware Security and Trust | 3 0 0 | 3 |
| ENGG | 19ECE343 | FPGA Based System Design | 3 0 0 | 3 |
| ENGG | 19ECE344 | Embedded Systems | 3 0 0 | 3 |
| ENGG | 19ECE345 | Computer Systems Architecture | 3 0 0 | 3 |
| ENGG | 19ECE346 | Digital IC Design | 3 0 0 | 3 |
| ENGG | 19ECE347 | Electronic System Level Design and Verification | 3 0 0 | 3 |
| ENGG | 19ECE348 | VLSI Testing and Testability | 3 0 0 | 3 |
| ENGG | 19ECE349 | RISC Processor Design using HDL | 3 0 0 | 3 |
| ENGG | 19ECE350 | VLSI Signal Processing | 3 0 0 | 3 |
| Computational Engineering | | | | |
| ENGG | 19ECE351 | Markov Process and Queuing Theory | 3 0 0 | 3 |
| ENGG | 19ECE352 | Operations Research | 3 0 0 | 3 |
| ENGG | 19ECE353 | Convex Optimization | 3 0 0 | 3 |
| ENGG | 19ECE354 | Deep Learning | 3 0 0 | 3 |
| ENGG | 19ECE355 | Bio Inspired Algorithms | 3 0 0 | 3 |
| ENGG | 19ECE356 | Game Theory | 3 0 0 | 3 |
| ENGG | 19ECE357 | Pattern Recognition | 3 0 0 | 3 |
| ENGG | 19ECE358 | Signal Processing for Business Applications | 3 0 0 | 3 |
| ENGG | 19ECE359 | Non-linear Dynamics and Chaos | 3 0 0 | 3 |
| ENGG | 19ECE360 | Agent Based Modeling | 3 0 0 | 3 |

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|--------------------------------------|----------|---|-------|---|
| ENGG | 19ECE361 | Data Structures and Algorithms | 3 0 0 | 3 |
| ENGG | 19ECE362 | Software Engineering | 2 0 3 | 3 |
| ENGG | 19ECE363 | Machine Learning | 3 0 0 | 3 |
| Wireless Communications and Networks | | | | |
| ENGG | 19ECE431 | Wireless Communication | 3 0 0 | 3 |
| ENGG | 19ECE432 | Software Defined Networks | 3 0 0 | 3 |
| ENGG | 19ECE433 | Orthogonal Frequency Division Multiplexing | 3 0 0 | 3 |
| ENGG | 19ECE434 | MIMO and Multicarrier Systems | 3 0 0 | 3 |
| ENGG | 19ECE435 | Spread Spectrum Communication | 3 0 0 | 3 |
| ENGG | 19ECE436 | Wireless Sensor Networks | 3 0 0 | 3 |
| ENGG | 19ECE437 | Mobile Communication | 3 0 0 | 3 |
| ENGG | 19ECE438 | Vehicular Communication | 3 0 0 | 3 |
| ENGG | 19ECE439 | Millimeter Wave Personal Communication Systems | 3 0 0 | 3 |
| ENGG | 19ECE440 | Telecommunication Management | 3 0 0 | 3 |
| RF System design | | | | |
| ENGG | 19ECE441 | Avionics | 3 0 0 | 3 |
| ENGG | 19ECE442 | Antenna Systems | 3 0 0 | 3 |
| ENGG | 19ECE443 | Planar Microwave Devices | 3 0 0 | 3 |
| ENGG | 19ECE444 | Satellite Communication | 3 0 0 | 3 |
| Signal Processing | | | | |
| ENGG | 19ECE451 | Spoken Language Processing | 3 0 0 | 3 |
| ENGG | 19ECE452 | Radar Signal Processing | 3 0 0 | 3 |
| ENGG | 19ECE453 | Statistical Signal Processing | 3 0 0 | 3 |
| ENGG | 19ECE454 | Image Processing | 3 0 0 | 3 |
| ENGG | 19ECE455 | Biomedical Signal Processing | 3 0 0 | 3 |
| ENGG | 19ECE456 | Hyperspectral Image Analysis | 3 0 0 | 3 |
| ENGG | 19ECE457 | Wavelets and Application | 3 0 0 | 3 |
| ENGG | 19ECE458 | Adaptive Signal Processing | 3 0 0 | 3 |
| Instrumentation and Control | | | | |
| ENGG | 19ECE461 | Intelligent Control Systems | 3 0 0 | 3 |
| ENGG | 19ECE462 | Process Control | 3 0 0 | 3 |
| ENGG | 19ECE463 | Smart Sensors | 3 0 0 | 3 |
| ENGG | 19ECE464 | Virtual Instrumentation for Communication Systems | 3 0 0 | 3 |
| ENGG | 19ECE465 | Electric Drives | 3 0 0 | 3 |
| ENGG | 19ECE466 | Industrial Instrumentation | 3 0 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 |
| 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 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 |

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|-----|----------|-------------------------------|-------|---|
| HUM | 19MEE347 | Total Quality Management | 3 0 0 | 3 |
| 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 |
| 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 |

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| 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 |