ELECTRICAL ENGINEERING DEPARTMENT REQUIREMENTS

The Department of Electrical Engineering offers the B.Sc. degree in the following three routes of specializations:

1) Electrical Power and Machines Engineering
2) Electronics and Communications Engineering
3) Computer Engineering

III-I) General EE Dept. Compulsory Core Courses (43 Cr. Hrs.)

<table>
<thead>
<tr>
<th>Course No</th>
<th>Course Title</th>
<th>Cr. Hrs.</th>
<th>Prerequisite</th>
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</thead>
<tbody>
<tr>
<td>EE 202</td>
<td>Object-Oriented Computer Programming</td>
<td>3</td>
<td>EE201</td>
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<tr>
<td>MATH 205</td>
<td>Series and Vector Calculus</td>
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<tr>
<td>EE 250</td>
<td>Basic Electrical Circuits</td>
<td>4</td>
<td>PHYS 202, ELCS 102</td>
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<tr>
<td>IE 256</td>
<td>Engineering Management</td>
<td>2</td>
<td>IE 255</td>
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<tr>
<td>EE 300</td>
<td>Analytical Methods in Engineering</td>
<td>3</td>
<td>MATH 203</td>
</tr>
<tr>
<td>EE 301</td>
<td>Electrical Circuits and Systems</td>
<td>3</td>
<td>EE250, MATH 204</td>
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<tr>
<td>EE 311</td>
<td>Electronics I</td>
<td>4</td>
<td>EE250</td>
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<tr>
<td>EE 321</td>
<td>Introduction to Communications</td>
<td>4</td>
<td>EE301</td>
</tr>
<tr>
<td>EE 331</td>
<td>Principles of Automatic Control</td>
<td>4</td>
<td>EE300, EE301</td>
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<td>EE 360</td>
<td>Digital Design I</td>
<td>4</td>
<td>EE 250</td>
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<tr>
<td>EE 366</td>
<td>Microprocessors and microcontrollers</td>
<td>3</td>
<td>EE 360, EE 202</td>
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<td>EE 499</td>
<td>B.SC. Project</td>
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<td>EE 321, EE 331, STAT 110</td>
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<tr>
<td>EE 390</td>
<td>Summer Training</td>
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### III-1) Specialization of Electric Power and Machines Engineering Requirements:

#### III-1-1) Compulsory Courses for Power and Machine Specialization (31 cr. Hrs)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>ME 240</td>
<td>Thermal Engineering for Non ME Students</td>
<td>2</td>
<td>PHYS 281</td>
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<tr>
<td>EE 302</td>
<td>Electromagnetic Fields</td>
<td>3</td>
<td>EE 250, MATH 205</td>
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<tr>
<td>EE 303</td>
<td>Electrical Measurements and Instrumentation</td>
<td>3</td>
<td>EE 311, STAT 110</td>
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<tr>
<td>EE 341</td>
<td>Electromechanical Energy Conversion I</td>
<td>3</td>
<td>EE 301, EE 302</td>
</tr>
<tr>
<td>EE 351</td>
<td>Electrical Power Systems I</td>
<td>3</td>
<td>EE 250</td>
</tr>
<tr>
<td>EE 441</td>
<td>Electromechanical Energy Conversion II</td>
<td>3</td>
<td>EE 341, EE 351</td>
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<tr>
<td>EE 442</td>
<td>Power Electronic I</td>
<td>3</td>
<td>EE 311</td>
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<tr>
<td>EE 451</td>
<td>Electrical Power Systems II</td>
<td>3</td>
<td>EE 351</td>
</tr>
<tr>
<td>EE 453</td>
<td>Power Transmission and Distribution</td>
<td>3</td>
<td>EE 351, STAT 110</td>
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<tr>
<td>EE 454</td>
<td>Switchgear and Protection of Power System I</td>
<td>3</td>
<td>EE 341, EE 351</td>
</tr>
<tr>
<td>EE 404</td>
<td>Power systems lab</td>
<td>1</td>
<td>EE351 and department approval.</td>
</tr>
<tr>
<td>EE 405</td>
<td>Machines lab</td>
<td>1</td>
<td>EE 341 and department approval.</td>
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<td><strong>Total</strong></td>
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### III-1-2) Electives Course for Power and Machine Specialization (12 Cr. Hrs.)

<table>
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<th>Course No.</th>
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<tr>
<td>ME 482</td>
<td>Power Plants for Electrical Engineering Students</td>
<td>3</td>
<td>ME 240</td>
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<tr>
<td>EE 403</td>
<td>Power Systems Instrumentation and Measurements</td>
<td>3</td>
<td>EE 303</td>
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<td>EE 431</td>
<td>Advanced Control Systems</td>
<td>3</td>
<td>EE 331</td>
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<td>EE 440</td>
<td>Power System Transients</td>
<td>3</td>
<td>EE 341, EE 351</td>
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<tr>
<td>EE 443</td>
<td>Electromechanical Energy Conversion III</td>
<td>3</td>
<td>EE 441</td>
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<tr>
<td>EE 444</td>
<td>Power Electronics II</td>
<td>3</td>
<td>EE 442</td>
</tr>
<tr>
<td>EE 445</td>
<td>Utilization of Electrical Energy</td>
<td>3</td>
<td>EE 341, EE 351</td>
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<tr>
<td>EE 446</td>
<td>HV and EHV AC Transmission Systems</td>
<td>3</td>
<td>EE 351</td>
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<td>EE 447</td>
<td>High Voltage Direct Current(HVDC) Systems</td>
<td>3</td>
<td>EE 351</td>
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<tr>
<td>EE 448</td>
<td>Power System Planning and Reliability</td>
<td>3</td>
<td>EE 351, STAT 110</td>
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<tr>
<td>EE 449</td>
<td>Power System Stability</td>
<td>3</td>
<td>EE 441</td>
</tr>
<tr>
<td>EE 450</td>
<td>Power System Control</td>
<td>3</td>
<td>EE 441, EE 331</td>
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<tr>
<td>EE 452</td>
<td>High Voltage Techniques I</td>
<td>3</td>
<td>EE 351</td>
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<tr>
<td>EE 455</td>
<td>Economic Operation of Power Systems</td>
<td>3</td>
<td>EE 451, STAT 110</td>
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<tr>
<td>EE 456</td>
<td>High Voltage Techniques II</td>
<td>3</td>
<td>EE 452</td>
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<tr>
<td>EE 457</td>
<td>Switchgear and Protection of Power Systems II</td>
<td>3</td>
<td>EE 454</td>
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<tr>
<td>EE 458</td>
<td>Computers Applications in Power Systems</td>
<td>3</td>
<td>EE 332, EE 451</td>
</tr>
<tr>
<td>EE 459</td>
<td>Electric Power Distribution</td>
<td>3</td>
<td>EE 451, EE 453</td>
</tr>
<tr>
<td>EE 490</td>
<td>Special Topics in Electrical Engineering</td>
<td>3</td>
<td>EE 321, EE 331, STAT 110</td>
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<tr>
<td>EE 491</td>
<td>Special Topics in Electrical Power Engineering</td>
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<td>EE 451</td>
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<tr>
<td>EE 492</td>
<td>Special Topics in Electrical Machines</td>
<td>3</td>
<td>EE 441</td>
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<td>xx xxx</td>
<td>Any Course offered by the Department, Faculty or University and approved by the Department</td>
<td>3</td>
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### III-2) Specialization of Electronics and Communications Engineering Requirements:

#### III-2-1) Compulsory for Electronics and Communications Specialization (31 Cr. Hrs.)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
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<tbody>
<tr>
<td>EE 302</td>
<td>Electromagnetic Fields</td>
<td>3</td>
<td>EE 250, MATH 205</td>
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<tr>
<td>EE 306</td>
<td>Electrical Engineering Technologies</td>
<td>3</td>
<td>EE 311, STAT 110</td>
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<tr>
<td>EE 312</td>
<td>Electronics II</td>
<td>3</td>
<td>EE 311</td>
</tr>
<tr>
<td>EE 351</td>
<td>Electrical Power Systems I</td>
<td>3</td>
<td>EE 250</td>
</tr>
<tr>
<td>EE 411</td>
<td>Digital Electronics</td>
<td>4</td>
<td>EE 311, EE 360</td>
</tr>
<tr>
<td>EE 413</td>
<td>Communication Circuits</td>
<td>3</td>
<td>EE 312</td>
</tr>
<tr>
<td>EE 421</td>
<td>Communication Theory I</td>
<td>3</td>
<td>EE 321, STAT 110</td>
</tr>
<tr>
<td>EE 423</td>
<td>Electromagnetic Waves</td>
<td>3</td>
<td>EE 302, MATH 204</td>
</tr>
<tr>
<td>EE 425</td>
<td>Communication Systems</td>
<td>3</td>
<td>EE 312, EE 421, EE 423</td>
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<tr>
<td>EE 429</td>
<td>Digital Signal Processing</td>
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<td>EE 321</td>
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**Total** 31
III-2-2) Electives for Electronics and Communications Specialization (12 Cr. Hrs.)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
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<tr>
<td>EE 410</td>
<td>Advanced Electromagnetic</td>
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<td>EE 424</td>
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<td>EE 412</td>
<td>Integrated Circuits</td>
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<td>EE 312</td>
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<td>EE 414</td>
<td>Computer-Aided Analysis and Design of Electronic Circuits</td>
<td>3</td>
<td>EE 312</td>
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<td>EE 415</td>
<td>Measurements and Electronic Instruments</td>
<td>3</td>
<td>EE 423, STAT 110</td>
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<td>EE 416</td>
<td>Quantum and Optical Electronics</td>
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<td>EE 312</td>
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<td>EE 418</td>
<td>Microwave and Optical Devices</td>
<td>3</td>
<td>EE 312, EE 423</td>
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<tr>
<td>EE 419</td>
<td>VLSI Layout</td>
<td>3</td>
<td>EE 312</td>
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<td>EE 420</td>
<td>Microwave Circuits</td>
<td>3</td>
<td>EE 312, EE 423</td>
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<tr>
<td>EE 422</td>
<td>Satellite Communications</td>
<td>3</td>
<td>EE 421, EE 423</td>
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<tr>
<td>EE 424</td>
<td>Antennas and Propagation</td>
<td>3</td>
<td>EE 423</td>
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<td>EE 426</td>
<td>Digital Communications</td>
<td>3</td>
<td>EE 421</td>
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<tr>
<td>EE 427</td>
<td>Communication Theory II</td>
<td>3</td>
<td>EE 421</td>
</tr>
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<td>EE 428</td>
<td>Radar Systems and Applications</td>
<td>3</td>
<td>EE 413, EE 424</td>
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<td>EE 490</td>
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<td>EE 321, EE 331, STAT 110</td>
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<td>EE 493</td>
<td>Special Topics in Electronics</td>
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<td>EE 412</td>
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<tr>
<td>EE 494</td>
<td>Special Topics in Communications</td>
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<td>EE 321</td>
</tr>
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<td>xx xxx</td>
<td>Any Course offered by the Department, Faculty or University</td>
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### III-3) Specialization of Computer Engineering Requirements:

### III-3-1) Compulsory Courses for Computer Engineering Specialization (31 Cr. Hrs.)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Cr. Hr.</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>EE 306</td>
<td>Electrical Engineering Technologies</td>
<td>3</td>
<td>EE 311, STAT 110</td>
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<tr>
<td>EE 305</td>
<td>Discrete Mathematics and Its Applications</td>
<td>3</td>
<td>EE 202, MATH 204</td>
</tr>
<tr>
<td>EE 361</td>
<td>Digital Computer Organization</td>
<td>3</td>
<td>EE 360, EE 305, STAT 110</td>
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<tr>
<td>EE 364</td>
<td>Advanced Programming</td>
<td>3</td>
<td>EE 202</td>
</tr>
<tr>
<td>EE 367</td>
<td>Data Structures and Algorithms</td>
<td>3</td>
<td>EE 305, EE 364, STAT 110</td>
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<tr>
<td>EE 411</td>
<td>Digital Electronics</td>
<td>4</td>
<td>EE 311, EE 360</td>
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<tr>
<td>EE 460</td>
<td>Digital Design II</td>
<td>3</td>
<td>EE 360</td>
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<td>EE 462</td>
<td>Computer Communication Networks</td>
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<td>EE 321, EE 361</td>
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<td>EE 463</td>
<td>Operating Systems</td>
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<td>EE 361, EE 367</td>
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<td>EE 467</td>
<td>Databases</td>
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<td>EE 367</td>
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Total  31
### III-3-2) Elective Courses for Computer Engineering Specialization (12 Cr. Hrs.)

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<tr>
<td>EE 312</td>
<td>Electronics II</td>
<td>3</td>
<td>EE 311</td>
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<td>EE 431</td>
<td>Advanced Control Systems</td>
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<td>EE 331</td>
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<td>EE 432</td>
<td>Digital Control Systems</td>
<td>3</td>
<td>EE 331</td>
</tr>
<tr>
<td>EE 433</td>
<td>Introduction to Robotics</td>
<td>3</td>
<td>EE 331</td>
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<tr>
<td>EE 464</td>
<td>Structure of Programming Languages</td>
<td>3</td>
<td>EE 361, EE 367</td>
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<tr>
<td>EE 466</td>
<td>Computer Interfacing</td>
<td>3</td>
<td>EE 361, EE 411</td>
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<td>EE 468</td>
<td>Systems Programming</td>
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<td>EE 361, EE 367</td>
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<tr>
<td>EE 469</td>
<td>Compiler Construction</td>
<td>3</td>
<td>EE 367</td>
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<tr>
<td>EE 480</td>
<td>Modeling and Simulation</td>
<td>3</td>
<td>EE 364, STAT 110, EE 305</td>
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<tr>
<td>EE 481</td>
<td>Computer Graphics</td>
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<td>EE 364, EE 367</td>
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<td>EE 482</td>
<td>Introduction to Artificial Intelligence</td>
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<td>EE 367</td>
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<td>EE 483</td>
<td>Advanced Computer Architecture and Modern Peripherals</td>
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<td>EE 361</td>
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<td>EE 484</td>
<td>VLSI Design</td>
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<td>EE 460, EE 411</td>
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<td>EE 488</td>
<td>Formal Languages and Automata Theory</td>
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<td>EE 305, EE 367</td>
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<td>Special Topics in Electrical Engineering</td>
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<td>EE 321, EE 331, STAT 110</td>
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<td>Special Topics in Computer Engineering</td>
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<td>EE 361, EE 367, EE 331</td>
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<td>EE 496</td>
<td>Special Topics in Automatic Control</td>
<td>3</td>
<td>EE 331, STAT 110</td>
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<tr>
<td>xx xxx</td>
<td>Any Course offered by the Department, faculty or University</td>
<td>3</td>
<td>Department Approval</td>
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</tbody>
</table>

xx xxx: Any Course offered by the Department, faculty or University
Courses Descriptions

EE201 Structured Computer Programming (2:2,1)
Prerequisite: MATH 110

EE202 Object-Oriented Computer Programming (3:3,1)
Object-oriented programming: classes, objects and methods. Object-oriented design. Simple data structures. Best programming practices (structured coding, documentation, testing and debugging).
Prerequisite: EE 201

EE 250 Basic Electrical Circuits (4:3,2)
Prerequisite: PHYS 202, ELCS 102

EE 251 Basic Electrical Engineering (3:3,1)
Prerequisite: PHYS 202, ELCS 102

EE 300 Analytical Methods in Engineering (3:3, 1)
Prerequisite: MATH 203

EE 301 Electrical Circuits And Systems (3:3, 1)
Prerequisites: EE 250, MATH 204

EE 302 Electromagnetic Fields (3:3, 1)
Prerequisites: EE 250, MATH 205

EE 303 Electrical Measurements and Instrumentation (3:3,1)
Fundamental Measurement Concepts, Generalized measurement system, errors in measurements, characteristics of measuring instruments, statistical analysis of errors. Oscilloscopes, analog AC and DC instruments, measurement of power, DC and AC
bridges, transducers, fundamental of electronic instruments, attenuators, converters, peak and average detectors. RMS detectors. digital instruments, digital display units, digital voltmeter.

**Prerequisites**: EE311, STAT 110

**EE 305 Discrete Mathematics and their Applications** (3:3, 1)

**Prerequisite**: EE 202, MATH 204

**EE 306 Electrical Engineering Technology** (3:3,1)

**Prerequisites**: EE 311, STAT 110

**EE 311 Electronics I** (4:3,2)
Conduction in metals and semiconductors, P-N junctions, diode circuits. Field-effect and junction transistors. Low frequency equivalent circuits. Basic amplifiers.

**Prerequisite**: EE 250

**EE 312 Electronics II** (4:3,2)

**Prerequisite**: EE 311

**EE 321 Introduction to Communications** (4:3,2)
Fourier Signal Analysis. Linear Modulation: AM, DSBSC, SSB, Frequency Conversion, generation and detection. FDM., Exponential Modulation: FM, PM, NBFM, WBFM. Pulse Modulation, Sampling Theorem, PAM, PDM, PPM, PCM, TDM., Digital Modulation ASK, PSK and FSK.

**Prerequisites**: EE 301

**EE 331 Principles of Automatic Control** (4:3, 2)
Introduction to control systems with examples from different fields. Transfer functions and block diagram algebra. Stability analysis (Routh-Hurwitz and Nyquist). Design of Control Systems using Bode diagrams and root locus techniques.

**Prerequisites**: EE 300, EE 301
EE 332 Computational Methods in Engineering (3:3, 1)
Prerequisites: EE 201, MATH 204

EE 341 Electromechanical Energy Conversion I (3:3, 1)
Prerequisite: EE 301, EE 302

EE 351 Electrical Power Systems I (3:3, 1)
Prerequisite: EE 250

EE 352 Electrical Machines and Electronics (for non EE students) (3: 3, 1)
Prerequisite: EE 251

EE 360 Digital Design I (4:3, 2)
Prerequisite: EE 250

EE 361 Digital Computer Organization (3:3, 1)
Prerequisites: EE 360, EE 305, STAT 110

EE 364 Advanced Programming (3:3, 1)
Structured programming concepts and control structure. Systematic program design. Modularization and scope concepts. Use of a variety of data structures and programming techniques. Iteration and recursion. Memory management. Program correctness, informal verification and testing.
Prerequisite: EE 202

EE 366 Microprocessor and Microcontrollers (3:3, 1)
This is an introductory course in designing microcontroller-based systems. Topics include an overview of a single-chip microcontroller, hardware and software concepts in microcomputers, system architecture, central processing unit (CPU), internal
memory (ROM, EEPROM, RAM, FLASH), Input/Output ports, serial communication, programmable interrupts and timers, microcontroller programming model and instruction set, assembly language programming.

**Prerequisite: EE 360**

**EE 367 Data Structures and Algorithms**
Basic concepts of data and their representations inside a computer (scalar, structured and dynamic). Manipulation of arrays, strings, stacks, queues, linear lists, circular lists, orthogonal lists, trees and graphs. Sorting and searching algorithms. File organization and file access methods.

**Prerequisites: EE 305, EE 364, STAT 110**

**EE 390 Summer Training (10 weeks)**
Training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements as assigned by the department.

**Prerequisite: student must complete 120 credit hours**

**EE 403 Power System Instrumentation and Measurements**

**Prerequisite: EE 303**

**EE 404 Power systems lab**
Short circuit phenomenon, Load flow, Phase sequence, Transient Stability. Voltage Recovery, Current Transformers, Over-current Protection, Differential Protection, and Distance Protection

**Prerequisite: EE 351. Academic advisor approval.**

**EE 405 Machines lab**
Operating characteristics of: DC motors, DC generator, 3-ph Induction motors, 1-ph induction motors. Alternator characteristics, alternators in parallel; synchronization, active and reactive power sharing. Synchronous motor characteristics.

**Prerequisite EE 341, Academic advisor approval.**

**EE 410 Advanced Electromagnetics**

**Prerequisite: EE 424**

**EE 411 Digital Electronics**

**Prerequisites: EE 311, EE 360**
EE 412 Integrated Circuits (3:3, 1)
Prerequisite: EE 312

EE 413 Communication Circuits (4:3, 3)
Behavior of Transistors at high frequencies. Analysis and design of electronic circuits employed in electronic and communication systems.
Prerequisite: EE 312

EE 414 Computer-Aided Analysis and Design of Electronic Circuits (3:3, 1)
Prerequisite: EE 312

EE 415 Measurements and Electronic Instruments (3:3, 1)
Prerequisites: EE 423, STAT 110

EE 416 Quantum and Optical Electronics (3:3, 1)
Fundamentals of quantum theory, Band theory of solids, Approximation methods, statistical and, thermodynamics approaches, semi conducting and optical properties of solids and applications.
Prerequisites: EE 312

EE 418 Microwave and Optical Devices (3:3, 1)
Prerequisites: EE 312, EE 423

EE 419 VLSI Layout (3:3, 1)
Prerequisites: EE 312

EE 420 Microwave Circuits (3:3, 1)
Analysis and applications of transmission lines. Filters, DC blockage. Couplers, mixers, radiators.
Prerequisites: EE 312, EE 423

EE 421 Communication Theory I (3:2, 3)
Autocorrelation function and spectral density. Random signal theory: Continuous and discrete random variables, transformation of random variables, stationary random processes, time averages and ergodicity, power spectral density of stationary random

**Prerequisites:** EE 321, STAT 110

**EE 422 Satellite Communications** (3:3, 1)

**Prerequisites:** EE 421, EE 423

**EE 423 Electromagnetic Waves** (3:2, 3)

**Prerequisites:** EE 302, MATH 204

**EE 424 Antennas and Propagation** (3:3, 1)

**Prerequisite:** EE 423

**EE 425 Communication Systems** (3:2, 3)

**Prerequisites:** EE 421, EE 312, EE 423

**EE 426 Digital Communications** (3:3, 1)

**Prerequisite:** EE 421

**EE 427 Communication Theory II** (3:3, 1)
Error Probabilities. Detection and Decision rules. Hypothesis testing cost function, decision rules, Bayes and W.P. testing, maximum likelihood detection, optimum

**Prerequisite:** EE 421

**EE 428 Radar Systems And Applications**


**Prerequisites:** EE 413, EE 424

**EE 429 Digital Signal Processing**


**Prerequisite:** EE 321

**EE 431 Advanced Control Systems**

State space representation and realization, controllability and observability. Liapunov and Popov stability criteria, stochastic and sampled data control theory, optimal control theory.

**Prerequisite:** EE 331

**EE 432 Digital Control Systems**


**Prerequisite:** EE 331

**EE 433 Introduction to Robotics**


**Prerequisite:** EE 331

**EE 440 Power System Transients**


**Prerequisites:** EE 341, EE 351

**EE 441 Electromechanical Energy Conversion II**


**Prerequisites:** EE 341, EE 351
EE 442 Power Electronics I  
Prerequisite: EE 311

EE 443 Electromechanical Energy Conversion III  
Prerequisite: EE 441

EE 444 Power Electronics II  
Prerequisite: EE 442

EE 445 Utilization Of Electrical Energy  
Prerequisites: EE 341, EE 351

EE 446 HV and EHV AC Transmission Systems  
Prerequisite: EE 351

EE 447 High Voltage Direct Current (HVDC) Systems  
Prerequisite: EE 351

EE 448 Power System Planning and Reliability  
Prerequisites: STAT 110, EE 351

EE 449 Power System Stability  
Prerequisite: EE 441
EE 450  Power System Control  
Power factor Control, Automatic generation control, Load-frequency Control, Economic dispatch, Unit Commitment, reactive power control, Potential Instability and Breakdown, Reactive power distribution. 
**Prerequisites:** EE 331, EE 441 (concurrent)

EE 451  Electrical Power Systems II  
**Prerequisite:** EE 351

EE 452  High Voltage Techniques I  
Generation of high AC and DC impulse voltages, and impulse currents. Measurement of high voltages and currents. Dielectric loss and capacitance measurements. 
**Prerequisite:** EE 351

EE 453  Power Transmission and Distribution  
Transmission line parameters, Mechanical design of overhead transmission lines, Underground cables, Distribution Systems. Distribution substation design. Surges on transmission systems, System earthing. 
**Prerequisites:** EE 351, STAT 110

EE 454  Switchgear and Protection of Power Systems I  
Switch gear, busbar systems, couplers, cubicles, auxiliaries, and single line diagram. Relays, electromagnetic, static, thermal relay, and over current, voltage. Distance relays. Differential relays. Feeder protection system. Transformer protection system. Generator protection system. 
**Prerequisites:** EE 341, EE 351

EE 455  Economic Operation of Power Systems  
**Prerequisites:** EE 451, STAT 110

EE 456  High Voltage Techniques II  
**Prerequisite:** EE 452

EE 457  Switchgear and Protection of Power Systems II  
microprocessors to substation control. Testing and Commissioning.

**Prerequisite:** EE 454

**EE 458 Computer Applications in Power Systems** (3:3, 1)

**Prerequisites:** EE 332, EE 451

**EE 459 Electric Power Distribution** (3:3, 1)

**Prerequisites:** EE 451, EE 453

**EE 460 Digital Design II** (3:2,3)

**Prerequisites:** EE 360

**EE 462 Computer Communication Networks** (3:3, 1)

**Prerequisites:** EE 321, EE 361

**EE 463 Operating Systems** (3:3, 1)

**Prerequisites:** EE 361, EE 367

**EE 464 Structure of Programming Languages** (3:3, 1)

**Prerequisites:** EE 361, EE 367

**EE 466 Computer Interfacing** (3:3, 1)
Basics of data transfer (Serial and parallel modes, 110 transfer initiation using polling and interrupt schemes, Standard busses). Interface components and their characteristics (Drivers, receivers, interface chips, Analog-to- digital converters). Designing interface circuits for standard busses.
Prerequisites: EE 361, EE 411

EE 467 Databases (3:3, 1)
The need for the database approach. Storage structures. Basic data structures (relational, hierarchical, and network approaches). The network approach (Architecture of the DBTG system, Set constructs, external level of DBTG, data manipulation commands). The hierarchical approach (IMS data structure, external and internal levels, data manipulation). The Relational approach (relational algebra and calculus. Query-by-example).
Prerequisites: EE 367

EE 468 Systems Programming (3:3, 1)
Prerequisites: EE 361, EE 367

EE 469 Compiler Construction (3:3, 1)
Prerequisite: EE 367

EE 480 Modeling and Simulation (3:3, 1)
Prerequisites: EE 364, STAT 110, EE 305

EE 481 Computer Graphics (3:3, 1)
Prerequisite: EE 364, EE 367

EE 482 Introduction to Artificial Intelligence (3:3, 1)
Prerequisite: EE 367

EE 483 Advanced Computer Architecture and Modern Peripherals (3:3, 1)
Survey of hardware description languages, Concepts of parallel processing, and super computer architectures. Study of modern peripherals like optical storage, bubble memories and laser printers.
Prerequisite: EE 361
EE 484 VLSI Design (3:3, 1)
Prerequisite: EE 460, EE 411

EE 488 Formal Languages and Automata Theory (3:3, 1)
Prerequisite: EE 305, EE 367

EE490 Special Topics in Electrical Engineering (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 321, EE 331, STAT 110

EE 491 Special Topics in Electrical Power Engineering (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 451

EE492 Special Topics in Electrical Machines (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 441

EE 493 Special Topics in Electronics (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 412

EE 494 Special Topics in Communications (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 321

EE 495 Special Topics in Computer Engineering (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 361, EE 367, EE 331

EE 496 Special Topics in Automatic Control (3:3, 1)
Selected topic to develop the skills and knowledge in a given field.
Prerequisite: EE 331, STAT 110

EE 499 B.SC. Project (4:2, 4)
Selection of topic: literature review; project design planning, arranging for data collection, and experimental work. Experimental work and data collection or field study (if any). Data processing analysis and results. Preparation of the first draft of final report. Presentation of the project.
Prerequisite: EE 321, EE 331, STAT 110