

| SCHOOL OF ENGINEERING   |   |   |                                |
|---|---|---|--------------------------------|
| Degree: BACHELOR OF SCIENCE<br>Credits: 128   |   | CURRICULUM<br>Since: August 2018 (201901) |                                |
| Program: ELECTRICAL ENGINEERING   |   |   |                                |
| Description: The Electrical Engineering Program offers students an exciting curriculum covering diverse areas including power, electronics, computers, controls, communications, and signal processing. |   |   |                                |
| Course Code   | Course Title  | Credits                                   | Prerequisites                  |
| <b>General Education Courses</b>  |   |   |                                |
| SPAN 152  | Fundamentals of Reading and Writing   | 3   | Placement Exam                 |
| SPAN 250  | Writing Techniques  | 3   | SPAN 152                       |
| ENGL 152  | Fundamentals of Reading and Writing   | 3   | Placement Exam                 |
| ENGL 153  | Advanced Communicative English  | 3   | ENGL 152                       |
| ENGL 231  | Research and Writing  | 3   | ENGL 153                       |
| MATH 152  | Pre-Calculus II   | 4   | Placement Exam                 |
| PHSC 215  | Physics for Engineering I (includes Lab)                                      | 4   | MATH 221                       |
| CHEM 203  | General Chemistry I   | 4   | MATH 151                       |
| HUMA 111  | Universal Culture and Civilization I  | 3   |                                |
| SOSC 111  | Individual, Community, Government and Social Responsibility I                 | 3   |                                |
| SOSC 112  | Individual, Community, Government and Social Responsibility II                | 3   | SOSC 111                       |
| FSEN 105  | Introduction to Engineering   | 3   |                                |
| MATH 221  | Calculus I  | 4   | MATH 152                       |
| MATH 222  | Calculus II   | 4   | MATH 221                       |
| MATH 223  | Calculus III  | 4   | MATH 222                       |
| MATH 395  | Differential Equations  | 3   | MATH 222                       |
| PHSC 216  | Physics for Engineering II (includes Lab)                                     | 4   | PHSC 215                       |
|   | Free Elective <sup>1</sup> (see note for Entrepreneurship & Innovation minor) | 3   | Depends on Elective            |
| <b>Core Courses</b>   |   |   |                                |
| ENGI 122  | Introduction to Computer Programming  | 3   | MATH 152                       |
| ENGI 223  | Intermediate Programming  | 3   | ENGI 122 / MATH 221            |
| ELEN 301  | Electrical Networks I   | 3   | MATH 221                       |
| ELEN 302  | Electrical Networks I Laboratory  | 1   | MATH 221                       |
| ENGI 398  | Engineering Mathematics   | 3   | MATH 222 / ENGI 122            |
| <b>Concentration Courses</b>  |   |   |                                |
| ELEN 311  | Electrical Networks II  | 3   | ELEN 301 & 302/ MATH 395       |
| ELEN 312  | Digital Logic Design I  | 3   | ELEN 301 / ENGI 122            |
| ELEN 313  | Digital Logic Design I Laboratory   | 1   | ELEN 302 / ENGI 122            |
| ELEN 330  | Electronics I   | 3   | ELEN 301 & 302                 |
| ELEN 332  | Electronics I Laboratory  | 1   | ELEN 302                       |
| ELEN 360  | Random Signals and Systems  | 3   | MATH 222 / ELEN 301            |
| ELEN 370  | Electromagnetics  | 3   | PHSC 216 / MATH 223            |
| ELEN 415  | Signals, Systems, and Control   | 3   | ELEN 301 / MATH 395 / ENGI 398 |
| ELEN 417  | Systems Laboratory  | 1   | ELEN 415                       |
| ELEN 421  | Electromechanical Energy Conversion Laboratory                                | 1   | ELEN 302                       |
| ELEN 422  | Electrical Machines   | 3   | ELEN 311                       |
| ELEN 431  | Electronics II  | 3   | ELEN 330                       |
| ELEN 433  | Electronics II Laboratory   | 1   | ELEN 332                       |

| Course Code  | Course Title  | Credits | Prerequisites  |
|--|---|---------|--|
| <b>Concentration Courses (continued)</b>   |   |         |  |
| ELEN 442   | Microprocessors I   | 3       | ELEN 312   |
| ELEN 447   | Microprocessors Laboratory  | 1       | ELEN 313   |
| ELEN 474   | Communication Systems I   | 3       | ELEN 360 / ELEN 415                                  |
| ELEN 480   | Power System Analysis I   | 3       | ELEN 311   |
| ELEN 491   | Electrical Engineering Design Concepts                              | 3       | ELEN 311, 312 & 330                                  |
| ELEN 492   | Major Design Experience   | 3       | ELEN 422, 431, 433, 442 & 491 / Last semester status |
| <b>Selected Electives (Select a minimum of 9 credits from a single or combination of lists given below.)</b> |   |         |  |
| <b>Departmental Electives (Courses at the 500-level or above count toward the MSEE or MSCpE degrees.)</b>    |   |         |  |
|  | Any COMP or CPEN course in the B.S. Computer Engineering curriculum | 3       | As required by CpE Program                           |
| ECEN 400   | Survey of Electrical and Computer Engineering Topics                | 3       | Next to last semester status                         |
| ELEN 430   | Digital Electronics   | 3       | ELEN 330   |
| ELEN 434   | Instrumentation   | 3       | ELEN 431 / ELEN 433                                  |
| ELEN 436   | Power Electronics   | 3       | ELEN 330   |
| ELEN 441   | Digital Logic Design II   | 3       | ELEN 312 / ELEN 330                                  |
| ELEN 443   | Microprocessors II  | 3       | ELEN 442   |
| ELEN 460   | Digital Signal Processing   | 3       | ELEN 415   |
| ELEN 472   | Antennas and Transmission Lines                                     | 3       | ELEN 370   |
| ELEN 475   | Communication Systems II  | 3       | ELEN 474   |
| ELEN 478   | RF Design   | 3       | ELEN 431 / ELEN 474                                  |
| ELEN 481   | Power System Analysis II  | 3       | ELEN 480   |
| ELEN 484   | Power Transmission and Distribution                                 | 3       | ELEN 480   |
| ELEN 488   | Power System Reliability  | 3       | ELEN 480   |
| ELEN 497   | Special Topics  | 3       | ECE Head's permission                                |
| ELEN 498   | Undergraduate Research I  | 3       | ECE Head's permission                                |
| ELEN 499   | Undergraduate Research II   | 3       | ELEN 498/ECE Head's permission                       |
| ENGY 103   | Electrical Energy: Basic Concepts                                   | 1       |  |
| ENGY 203   | Fundamentals of Electrical Energy Systems                           | 1       | [ENGY 103] Co-Req.                                   |
| ENGY 303   | Energy and Electrical Power Systems                                 | 1       | [ENGY 203] Co-Req.                                   |
| ELEN 502   | Advanced Linear Systems   | 3       | ELEN 415 or instructor consent                       |
| ELEN 503   | Solid State Electronics   | 3       | ELEN 431 or instructor consent                       |
| ELEN 505   | Probability and Random Processes                                    | 3       | ELEN 360 or instructor consent                       |
| ELEN 510   | Advanced Power System Analysis                                      | 3       | ELEN 480 or instructor consent                       |
| ELEN 511   | Power System Dynamics and Control                                   | 3       | ELEN 480 or instructor consent                       |
| ELEN 520   | Digital Control Systems   | 3       | ELEN 415 or instructor consent                       |
| ELEN 550   | Digital Filters   | 3       | ELEN 415 or instructor consent                       |
| CPEN 502   | Advanced Analysis & Design of Algorithms                            | 3       | COMP 315 or instructor consent                       |
| CPEN 503   | Computer and Network Security                                       | 3       | CPEN 481 or instructor consent                       |
| CPEN 504   | Advanced Computer Architectures                                     | 3       | CPEN 444 or instructor consent                       |
| CPEN 505   | Database Management Systems   | 3       | CPEN 455 or instructor consent                       |
| CPEN 511   | Distributed Systems   | 3       | CPEN 444 & 452, or instructor consent                |
| CPEN 520   | Numerical Optimization  | 3       | COMP 411 or instructor consent                       |
| CPEN 550   | Operating Systems Programming                                       | 3       | CPEN 452 or instructor consent                       |
| CPEN 552   | Computer Graphics   | 3       | ENGI 223 or instructor consent                       |
| CPEN 640   | Embedded Systems  | 3       | ELEN 442 or instructor consent                       |

| Course Code  | Course Title  | Credits | Prerequisites                     |
|--|---|---------|-----------------------------------|
| <b>Non-Departmental and Non-Engineering Electives</b>  |   |         |                                   |
| ENGI 210   | Engineering Economy   | 3       | [MATH 221] Co-Req.                |
| ENTR 360   | Entrepreneurship  | 3       | Dean's permission                 |
| ENTR 401   | Identification and Evaluation of Entrepreneurial Opportunities      | 3       | Dean's permission                 |
| IMEN 341   | Accounting and Finance for Engineers                                | 3       | [MATH 221] Co-Req.                |
| IMEN 406   | Operations Research   | 3       | MATH 350 or IME Head's permission |
| TCOM 503   | Introduction to TCP/IP  | 3       |                                   |
| TCOM 513   | IT Project Management   | 3       |                                   |
| TCOM 521   | Introduction to Networking  | 3       |                                   |
| <b>Cybersecurity Option (Select a minimum of 9 credits from this list if pursuing this option; select all courses to earn a Certificate in Cybersecurity.)</b>                               |   |         |                                   |
| CYBR 501   | Network Security I  | 3       | Fourth Year Status                |
| CYBR 502   | Computer Security I   | 3       | Fourth Year Status                |
| CYBR 521*  | Network Security II   | 3       | CYBR 501                          |
| CYBR 522*  | Computer Security II  | 3       | CYBR 502                          |
| CYBR 600   | Cyber Forensics   | 3       | CYBR 502                          |
| * If pursuing the Certificate in Cybersecurity, CYBR 521 and CYBR 522 can only be taken after obtaining a B.S. degree.   |   |         |                                   |
| <b>Quality Assurance and Experimental Design Option (Select a minimum of 9 credits from this list if pursuing this option; select all courses to earn a minor.)</b>                          |   |         |                                   |
| IMEN 205*  | Principles of Engineering Management                                | 3       | MATH 152                          |
| IMEN 395   | Inferential Statistics for Engineers                                | 3       | IMEN 390 or ELEN 360              |
| IMEN 402   | Work Measurement  | 3       | IMEN 390 or ELEN 360              |
| IMEN 405   | Statistical Quality Control   | 3       | IMEN 390 / [IMEN 395] Co-Req.     |
| IMEN 416   | Design of Industrial Experiments                                    | 3       | IMEN 395                          |
| * Accepted only if upgrading to a minor.   |   |         |                                   |
| <b>Engineering Management Option (Select a minimum of 9 credits from this list if pursuing this option. These courses count toward the M.S. degree in Engineering Management.)</b>           |   |         |                                   |
| IMEN 510   | Engineering Management  | 3       | Fourth Year Status                |
| IMEN 551*  | Advanced Engineering Project Management*                            | 3       | Fourth Year Status                |
| IMEN 610   | Statistics for Decision Modeling                                    | 3       | Fourth Year Status                |
| IMEN 620   | Advanced Enterprise Continuous Improvement                          | 3       | Fourth Year Status                |
| IMEN 630   | Supply Chain Management for Engineers                               | 3       | Fourth Year Status                |
| IMEN 635   | Logistics Methods and Strategies                                    | 3       | Fourth Year Status                |
| IMEN 640   | Design and Operation of Logistics Networks                          | 3       | IMEN 635                          |
| IMEN 645   | Analytics for Decision Making                                       | 3       | IMEN 610                          |
| * TCOM 513 Information Technology Project Management may be used as a substitute for IMEN 551.   |   |         |                                   |
| <b>Entrepreneurship and Innovation Minor (Including ELEN 494, select from the list below until a minimum of 12 credits is completed.)<sup>1</sup></b>  |   |         |                                   |
| INNO 300   | Sustainable Innovation (or ENTR 360)                                | 3       | Third Year Status                 |
| INNO 303   | Product Development, Prototyping, and Idea Validation (or ENTR 401) | 3       | INNO 300                          |
| INNO 400   | Startup Internship  | 3       | School's permission               |
| MANA 204   | Mercantile Law and Corporate Ethics (or IMEN 341)                   | 3       |                                   |
| <sup>1</sup> Students pursuing the minor in Entrepreneurship and Innovation must take at least one course of the minor sequence outside the School of Engineering as a free elective course. |   |         |                                   |

**Minimum grade required: All courses in the program must be passed with a minimum grade of C.**

**Rev. 05/08/2018**

| <b>SCHOOL OF ENGINEERING</b>           |   |                                    |                                |
|--|---|------------------------------------|--------------------------------|
| <b>Degree: BACHELOR OF SCIENCE</b>     |   | <b>PLAN OF STUDY</b>               |                                |
| <b>Credits: 128</b>                    |   | <b>Since: August 2018 (201901)</b> |                                |
| <b>Program: ELECTRICAL ENGINEERING</b> |   |                                    |                                |
| <b>Course Code</b>                     | <b>Course Title</b>   | <b>Credits</b>                     | <b>Prerequisites</b>           |
| <b>FIRST YEAR - FIRST SEMESTER</b>     |   |                                    |                                |
| FSEN 105                               | Introduction to Engineering                                   | 3                                  |                                |
| MATH 152                               | Pre-Calculus II   | 4                                  | Placement Exam                 |
| SOSC 111                               | Individual, Community, Government and Social Responsibility I | 3                                  |                                |
| ENGL 152                               | Fundamentals of Reading and Writing                           | 3                                  | Placement Exam                 |
| SPAN 152                               | Fundamentals of Reading and Writing                           | 3                                  | Placement Exam                 |
|  |   | <b>16</b>                          |                                |
| <b>FIRST YEAR - SECOND SEMESTER</b>    |   |                                    |                                |
| ENGI 122                               | Introduction to Computer Programming                          | 3                                  | MATH 152                       |
| MATH 221                               | Calculus I  | 4                                  | MATH 152                       |
| CHEM 203                               | General Chemistry I   | 4                                  | MATH 151                       |
| ENGL 153                               | Advanced Communicative English                                | 3                                  | ENGL 152                       |
| SPAN 250                               | Writing Techniques  | 3                                  | SPAN 152                       |
|  |   | <b>17</b>                          |                                |
| <b>SECOND YEAR – FIRST SEMESTER</b>    |   |                                    |                                |
| ENGI 223                               | Intermediate Programming                                      | 3                                  | ENGI 122 / MATH 221            |
| MATH 222                               | Calculus II   | 4                                  | MATH 221                       |
| PHSC 215                               | Physics for Engineering I                                     | 4                                  | MATH 221                       |
| ENGL 231                               | Research and Writing  | 3                                  | ENGL 153                       |
| HUMA 111                               | Universal Culture and Civilization I                          | 3                                  |                                |
|  |   | <b>17</b>                          |                                |
| <b>SECOND YEAR - SECOND SEMESTER</b>   |   |                                    |                                |
| ELEN 301                               | Electrical Networks I   | 3                                  | MATH 221                       |
| ELEN 302                               | Electrical Networks I Laboratory                              | 1                                  | MATH 221                       |
| MATH 223                               | Calculus III  | 4                                  | MATH 222                       |
| MATH 395                               | Differential Equations  | 3                                  | MATH 222                       |
| PHSC 216                               | Physics for Engineering II                                    | 4                                  | PHSC 215                       |
|  |   | <b>15</b>                          |                                |
| <b>THIRD YEAR - FIRST SEMESTER</b>     |   |                                    |                                |
| ELEN 311                               | Electrical Networks II  | 3                                  | ELEN 301 / ELEN 302 / MATH 395 |
| ELEN 330                               | Electronics I   | 3                                  | ELEN 301 / ELEN 302            |
| ELEN 332                               | Electronics I Laboratory                                      | 1                                  | ELEN 302                       |
| ELEN 360                               | Random signals and Systems                                    | 3                                  | MATH 222 / ELEN 301            |
| ELEN 370                               | Electromagnetics  | 3                                  | PHSC 216 / MATH 223            |
| ELEN 421                               | Electromechanical Energy Conversion Laboratory                | 1                                  | ELEN 302                       |
| ENGI 398                               | Engineering Mathematics                                       | 3                                  | MATH 222 / ENGI 122            |
|  |   | <b>17</b>                          |                                |
| <b>THIRD YEAR - SECOND SEMESTER</b>    |   |                                    |                                |
| ELEN 312                               | Digital Logic Design I  | 3                                  | ELEN 301 / ENGI 122            |
| ELEN 313                               | Digital Logic Design I Laboratory                             | 1                                  | ELEN 302 / ENGI 122            |
| ELEN 415                               | Signals, Systems, and Control                                 | 3                                  | ELEN 301 / MATH 395 / ENGI 398 |
| ELEN 422                               | Electrical Machines   | 3                                  | ELEN 311                       |
| ELEN 431                               | Electronics II  | 3                                  | ELEN 330                       |
| ELEN 433                               | Electronics II Laboratory                                     | 1                                  | ELEN 332                       |
|  | Selected Elective I   | 3                                  | Depends on Elective            |
|  |   | <b>17</b>                          |                                |

| Course Code                          | Course Title   | Credits   | Prerequisites   |
|--------------------------------------|--|-----------|---|
| <b>FOURTH YEAR - FIRST SEMESTER</b>  |  |           |   |
| ELEN 417                             | Systems Laboratory   | 1         | ELEN 415  |
| ELEN 442                             | Microprocessors I  | 3         | ELEN 312  |
| ELEN 491                             | Electrical Engineering Design Concepts                         | 3         | ELEN 311, 312 & 330                                     |
| SOSC 112                             | Individual, Community, Government and Social Responsibility II | 3         | SOSC 111  |
|                                      | Selected Elective II   | 3         | Depends on Elective                                     |
|                                      | Free Elective  | 3         | Depends on Elective                                     |
|                                      |  | <b>16</b> |   |
| <b>FOURTH YEAR - SECOND SEMESTER</b> |  |           |   |
| ELEN 447                             | Microprocessors Laboratory                                     | 1         | ELEN 313  |
| ELEN 474                             | Communication Systems I  | 3         | ELEN 360 / ELEN 415                                     |
| ELEN 480                             | Power System Analysis I  | 3         | ELEN 311  |
| ELEN 492                             | Major Design Experience  | 3         | ELEN 422, 431, 433, 442 & 491 /<br>Last semester status |
|                                      | Selected Elective III  | 3         | Depends on Elective                                     |
|                                      |  | <b>13</b> |   |

**Minimum grade required: All courses in the program must be passed with a minimum grade of C.**

**Rev. 05/08/2018**