

# B.S. ELECTRICAL ENGINEERING / M.S. ELECTRICAL AND COMPUTER ENGINEERING

## Overview

This is a structured and integrated program of 151 credit hours. Students may pursue this program from either of the undergraduate option available for Electrical Engineering Majors. It includes two required courses, ECE 715 and ECE 716, as well as the selection of advanced technical electives.

Note the following:

- At least 30 credit hours must be at the graduate (600 or 700) level. Of these, at least 12 credit hours must be at 700 level. More specifically, in addition to ECE 715 (M.S. Design Project I) and ECE 716 (M.S. Design Project II), at least 6 credit hours must be in courses open to graduate students only (700 level).
- Interested ECE Juniors with cumulative GPA above 3.0 may declare their intent to participate by submitting an official application to the Departmental Graduate Committee for admission into the M.S.E.C.E. portion of the program.
- A student wishing to drop out of the five-year program without the M.S.E.C.E. degree could receive the B.S.E.E. degree after completing all its requirements, including the senior design project.
- To qualify for the M.S.E.C.E. degree, students must meet all the pertinent Graduate School requirements, including an acceptable G.R.E. score and a minimum of 3.0 GPA in the 30 credit hours applied towards the M.S.E.C.E. degree.
- The student is awarded both the B.S.E.E. and the M.S.E.C.E. degrees after the requirements for both degrees are satisfied.

For more information about the BS/MS Program please refer to the College of Engineering Section (<http://bulletin.miami.edu/undergraduate-academic-programs/engineering/#fiveyearbsmsprogramtext>).

This program is intended for exceptional students to acquire both a Bachelor of Science and a Master of Science degree simultaneously, in five years rather than the 4 plus 2 years (approximately) it normally requires.

## Requirements

You must be an undergraduate student in the College of Engineering (CoE). A master's degree is considered the first professional degree in engineering. The Admission Committee will carefully review academic credentials for admission into our M.S. program. Students should discuss the program and possibility of entering with an academic adviser. Completed applications are due prior to the beginning of the final exams in your junior year.

Get the application form (it is different for US students and International students) from the CoE Office of Research and Graduate Studies, fill it out and then return it to the same office. The application fee is waived for currently enrolled students in the CoE.

Take the GRE Examination before the end of your senior year and attain a combined score of more than 1000 on the Verbal and Quantitative portions. You must have a cumulative GPA of at least 3.0 at the time of application.

For further information about admission into the graduate school see the Bulletin of the Graduate School (<http://bulletin.miami.edu/graduate-academic-programs/engineering/>).

For more detailed information about the CoE Five-Year programs, please refer to the College of Engineering Bulletin section (<http://bulletin.miami.edu/undergraduate-academic-programs/engineering/#fiveyearbsmsprogramtext>).

## Curriculum Requirements: B.S. in Electrical Engineering / M.S. Electrical and Computer Engineering

| Code  | Title   | Credit Hours |
|---|---|--------------|
| <b>B.S. IN ELECTRICAL ENGINEERING REQUIREMENTS (121 CREDIT HOURS)</b> |   |              |
| <b>Engineering Courses</b>  |   |              |
| EGN 110<br>or EGN 114<br>or EGN 123                                   | Innovation and Entrepreneurship in Engineering<br>Global Challenges Addressed by Engineering and Technology<br>Computing and Digital Solutions for the future | 3            |
| ECE 112   | Introduction to Engineering II  | 2            |
| ECE 118   | Introduction to Programming   | 3            |
| ECE 201   | Electrical Circuit Theory   | 3            |
| ECE 202   | Electronics I   | 3            |
| ECE 203   | Electrical Circuits Laboratory  | 1            |

|   |  |            |
|---|--|------------|
| ECE 206   | Circuits, Signals, and Systems                         | 3          |
| ECE 211   | Logic Design   | 3          |
| ECE 212   | Processors: Hardware, Software, and Interfacing        | 3          |
| ECE 218   | Data Structures  | 3          |
| ECE 301   | Electromagnetic Field Theory                           | 3          |
| ECE 302   | Electronics II   | 3          |
| ECE 303   | Electronics Laboratory                                 | 1          |
| ECE 315   | Digital Design Laboratory                              | 1          |
| ECE 316   | Structured Digital Design                              | 1          |
| ECE 336   | Discrete-Time Signals and Systems                      | 3          |
| ECE 481   | Senior Project I                                       | 1          |
| EE Core Electives <sup>1</sup>  |  | 6          |
| EE Design Elective <sup>1</sup>   |  | 3          |
| ECE Electives <sup>1,3</sup>  |  | 9          |
| Technical Electives <sup>1</sup>  |  | 9          |
| <b>Math and Science Courses</b>   |  |            |
| ECE 310   | Introduction to Engineering Probability                | 3          |
| MTH 151   | Calculus I for Engineers                               | 5          |
| MTH 162   | Calculus II  | 4          |
| MTH 210   | Introduction to Linear Algebra                         | 3          |
| MTH 311   | Introduction to Ordinary Differential Equations        | 3          |
| CHM 151   | Chemistry for Engineers                                | 3          |
| CHM 153   | Chemistry Laboratory for Engineers                     | 1          |
| PHY 221   | University Physics I                                   | 3          |
| PHY 222   | University Physics II                                  | 3          |
| PHY 223   | University Physics III                                 | 3          |
| PHY 224   | University Physics II Lab                              | 1          |
| PHY 225   | University Physics III Lab                             | 1          |
| <b>General Education Requirements</b>   |  |            |
| Written Communication Skills:   |  |            |
| WRS 105   | First-Year Writing I                                   | 3          |
| WRS 107   | First-Year Writing II: STEM                            | 3          |
| Quantitative Skills:  |  |            |
| MTH 151   | Calculus I for Engineers (fulfilled through the major) |            |
| Areas of Knowledge:   |  |            |
| Arts and Humanities Cognate   |  | 9          |
| People and Society Cognate  |  | 9          |
| STEM Cognate (9 credits) (fulfilled through the major)                            |  |            |
| <b>M.S. IN ELECTRICAL AND COMPUTER ENGINEERING REQUIREMENTS (30 CREDIT HOURS)</b> |  |            |
| ECE 715   | M.S. Design Project I                                  | 3          |
| ECE 716   | M.S. Design Project II                                 | 3          |
| ECE Electives   |  | 9          |
| ECE 600 Level Electives <sup>1,3</sup>  |  | 6          |
| 700 Level Technical Electives <sup>1,3</sup>                                      |  | 6          |
| <b>Total Credit Hours</b>   |  | <b>151</b> |

## Curriculum Requirements: B.S. in Electrical Engineering / M.S. Electrical and Computer Engineering - Audio Engineering Option

| Code  | Title  | Credit Hours |
|---|--|--------------|
| <b>B.S. IN ELECTRICAL ENGINEERING REQUIREMENTS (121 CREDIT HOURS)</b> |  |              |
| <b>Common Engineering Requirements</b>                                |  |              |
| EGN 110   | Innovation and Entrepreneurship in Engineering | 3            |

|   |   |   |
|---|---|---|
| or EGN 114  | Global Challenges Addressed by Engineering and Technology |   |
| or EGN 123  | Computing and Digital Solutions for the future            |   |
| ECE 112   | Introduction to Engineering II                            | 2 |
| ECE 118   | Introduction to Programming                               | 3 |
| ECE 201   | Electrical Circuit Theory                                 | 3 |
| ECE 202   | Electronics I   | 3 |
| ECE 203   | Electrical Circuits Laboratory                            | 1 |
| ECE 206   | Circuits, Signals, and Systems                            | 3 |
| ECE 211   | Logic Design  | 3 |
| ECE 212   | Processors: Hardware, Software, and Interfacing           | 3 |
| ECE 218   | Data Structures   | 3 |
| ECE 302   | Electronics II  | 3 |
| ECE 303   | Electronics Laboratory                                    | 1 |
| ECE 315   | Digital Design Laboratory                                 | 1 |
| ECE 316   | Structured Digital Design                                 | 1 |
| ECE 336   | Discrete-Time Signals and Systems                         | 3 |
| ECE 436   | Digital Signal Processing                                 | 3 |
| ECE 481   | Senior Project I  | 1 |
| ECE 502   | Engineering Acoustics                                     | 3 |
| ECE 540   | Digital Speech and Audio Processing                       | 3 |
| EE Core Electives   |   | 3 |
| ECE Design Elective   |   | 3 |
| <b>Audio Engineering Courses</b>  |   |   |
| MMI 172   |   | 1 |
| MMI 220   |   | 3 |
| MMI 501   |   | 3 |
| MMI 502   |   | 3 |
| MMI 503   |   | 3 |
| <b>Math &amp; Basic Science Credit Hours</b>                                      |   |   |
| ECE 310   | Introduction to Engineering Probability                   | 3 |
| MTH 151   | Calculus I for Engineers                                  | 5 |
| MTH 162   | Calculus II   | 4 |
| MTH 210   | Introduction to Linear Algebra                            | 3 |
| MTH 311   | Introduction to Ordinary Differential Equations           | 3 |
| CHM 151   | Chemistry for Engineers                                   | 3 |
| CHM 153   | Chemistry Laboratory for Engineers                        | 1 |
| PHY 221   | University Physics I                                      | 3 |
| PHY 222   | University Physics II                                     | 3 |
| PHY 224   | University Physics II Lab                                 | 1 |
| PHY 223   | University Physics III                                    | 3 |
| PHY 225   | University Physics III Lab                                | 1 |
| <b>General Education Requirements</b>   |   |   |
| Written Communication Skills:   |   |   |
| WRS 105   | First-Year Writing I                                      | 3 |
| WRS 107   | First-Year Writing II: STEM                               | 3 |
| Quantitative Skills:  |   |   |
| MTH 151   | Calculus I for Engineers (fulfilled through the major)    |   |
| Areas of Knowledge:   |   |   |
| Arts and Humanities Cognate   |   | 9 |
| People and Society Cognate  |   | 9 |
| STEM Cognate (9 credits) (fulfilled through the major)                            |   |   |
| <b>M.S. IN ELECTRICAL AND COMPUTER ENGINEERING REQUIREMENTS (30 CREDIT HOURS)</b> |   |   |

|                               |                        |            |
|-------------------------------|------------------------|------------|
| ECE 715                       | M.S. Design Project I  | 3          |
| ECE 716                       | M.S. Design Project II | 3          |
| Audio or Technical Electives  |                        | 9          |
| ECE 600 Level Electives       |                        | 9          |
| 700 Level Technical Electives |                        | 6          |
| <b>Total Credit Hours</b>     |                        | <b>152</b> |

## Suggested Plan of Study: B.S. in Electrical Engineering / M.S. Electrical and Computer Engineering

| Freshman Year                            |   | Credit Hours |
|--|---|--------------|
| <b>Fall</b>                              |   |              |
| EGN 110, 114,<br>or 123                  | Innovation and Entrepreneurship in Engineering<br>or Global Challenges Addressed by Engineering and Technology<br>or Computing and Digital Solutions for the future | 3            |
| WRS 105                                  | First-Year Writing I  | 3            |
| MTH 151                                  | Calculus I for Engineers  | 5            |
| PHY 221                                  | University Physics I  | 3            |
| <b>Credit Hours</b>                      |   | <b>14</b>    |
| <b>Spring</b>                            |   |              |
| ECE 112                                  | Introduction to Engineering II  | 2            |
| ECE 118                                  | Introduction to Programming   | 3            |
| WRS 107                                  | First-Year Writing II: STEM   | 3            |
| MTH 162                                  | Calculus II   | 4            |
| PHY 222                                  | University Physics II   | 3            |
| PHY 224                                  | University Physics II Lab   | 1            |
| <b>Credit Hours</b>                      |   | <b>16</b>    |
| <b>Sophomore Year</b>                    |   |              |
| <b>Fall</b>                              |   |              |
| ECE 201                                  | Electrical Circuit Theory   | 3            |
| ECE 218                                  | Data Structures   | 3            |
| MTH 311                                  | Introduction to Ordinary Differential Equations   | 3            |
| PHY 223                                  | University Physics III  | 3            |
| PHY 225                                  | University Physics III Lab  | 1            |
| Arts and Humanities Cognate <sup>1</sup> |   | 3            |
| <b>Credit Hours</b>                      |   | <b>16</b>    |
| <b>Spring</b>                            |   |              |
| ECE 202                                  | Electronics I   | 3            |
| ECE 203                                  | Electrical Circuits Laboratory  | 1            |
| ECE 206                                  | Circuits, Signals, and Systems  | 3            |
| ECE 211                                  | Logic Design  | 3            |
| MTH 210                                  | Introduction to Linear Algebra  | 3            |
| CHM 151                                  | Chemistry for Engineers   | 3            |
| CHM 153                                  | Chemistry Laboratory for Engineers  | 1            |
| <b>Credit Hours</b>                      |   | <b>17</b>    |
| <b>Junior Year</b>                       |   |              |
| <b>Fall</b>                              |   |              |
| ECE 301                                  | Electromagnetic Field Theory  | 3            |
| ECE 302                                  | Electronics II  | 3            |
| ECE 303                                  | Electronics Laboratory  | 1            |
| ECE 315                                  | Digital Design Laboratory   | 1            |
| ECE 336                                  | Discrete-Time Signals and Systems   | 3            |
| ECE 310                                  | Introduction to Engineering Probability   | 3            |

|  |   |            |
|--|---|------------|
| People and Society Cognate <sup>1</sup>  |   | 3          |
| <b>Credit Hours</b>                      |   | <b>17</b>  |
| <b>Spring</b>                            |   |            |
| ECE 212                                  | Processors: Hardware, Software, and Interfacing | 3          |
| ECE 316                                  | Structured Digital Design                       | 1          |
| EE Core Elective <sup>1</sup>            |   | 3          |
| EE Core Elective <sup>1</sup>            |   | 3          |
| ECE Elective <sup>1</sup>                |   | 3          |
| People and Society Cognate <sup>1</sup>  |   | 3          |
| <b>Credit Hours</b>                      |   | <b>16</b>  |
| <b>Senior Year</b>                       |   |            |
| <b>Fall</b>                              |   |            |
| ECE 481                                  | Senior Project I                                | 1          |
| ECE Elective <sup>1</sup>                |   | 3          |
| ECE Design Elective <sup>1</sup>         |   | 3          |
| ECE 600 Level Elective <sup>1</sup>      |   | 3          |
| ECE 600 Level Elective                   |   | 3          |
| Technical Elective <sup>1</sup>          |   | 3          |
| People and Society Cognate <sup>1</sup>  |   | 3          |
| <b>Credit Hours</b>                      |   | <b>19</b>  |
| <b>Spring</b>                            |   |            |
| Technical Elective <sup>1</sup>          |   | 3          |
| Technical Elective <sup>1</sup>          |   | 3          |
| Arts and Humanities Cognate <sup>1</sup> |   | 3          |
| Arts and Humanities Cognate <sup>1</sup> |   | 3          |
| ECE 600 Level Elective                   |   | 3          |
| ECE 600 Level Elective                   |   | 3          |
| <b>Credit Hours</b>                      |   | <b>18</b>  |
| <b>Fifth Year</b>                        |   |            |
| <b>Fall</b>                              |   |            |
| ECE 715                                  | M.S. Design Project I                           | 3          |
| ECE 600 Level Elective                   |   | 3          |
| ECE 700 Level Elective                   |   | 3          |
| <b>Credit Hours</b>                      |   | <b>9</b>   |
| <b>Spring</b>                            |   |            |
| ECE 716                                  | M.S. Design Project II                          | 3          |
| ECE 600 Level Elective                   |   | 3          |
| ECE 700 Level Elective                   |   | 3          |
| <b>Credit Hours</b>                      |   | <b>9</b>   |
| <b>Total Credit Hours</b>                |   | <b>151</b> |

<sup>1</sup> See description of electives under the Departmental Electives Section.

<sup>2</sup> Offered only in the Fall semester.

## Suggested Plan of Study: B.S. in Electrical Engineering / M.S. Electrical and Computer Engineering - Audio Engineering Option

|                         |   |                     |
|-------------------------|---|---------------------|
| <b>Freshman Year</b>    |   |                     |
| <b>Fall</b>             |   | <b>Credit Hours</b> |
| EGN 110, 114,<br>or 123 | Innovation and Entrepreneurship in Engineering<br>or Global Challenges Addressed by Engineering and Technology<br>or Computing and Digital Solutions for the future | 3                   |
| WRS 105                 | First-Year Writing I  | 3                   |

|  |   |           |
|--|---|-----------|
| MTH 151                                  | Calculus I for Engineers                        | 5         |
| PHY 221                                  | University Physics I                            | 3         |
| MMI 220                                  |   | 3         |
| <b>Credit Hours</b>                      |   | <b>17</b> |
| <b>Spring</b>                            |   |           |
| ECE 112                                  | Introduction to Engineering II                  | 2         |
| ECE 118                                  | Introduction to Programming                     | 3         |
| WRS 107                                  | First-Year Writing II: STEM                     | 3         |
| MTH 162                                  | Calculus II                                     | 4         |
| PHY 222                                  | University Physics II                           | 3         |
| PHY 224                                  | University Physics II Lab                       | 1         |
| <b>Credit Hours</b>                      |   | <b>16</b> |
| <b>Sophomore Year</b>                    |   |           |
| <b>Fall</b>                              |   |           |
| ECE 201                                  | Electrical Circuit Theory                       | 3         |
| ECE 218                                  | Data Structures                                 | 3         |
| MTH 311                                  | Introduction to Ordinary Differential Equations | 3         |
| PHY 223                                  | University Physics III                          | 3         |
| PHY 225                                  | University Physics III Lab                      | 1         |
| Arts and Humanities Cognate <sup>1</sup> |   | 3         |
| <b>Credit Hours</b>                      |   | <b>16</b> |
| <b>Spring</b>                            |   |           |
| ECE 202                                  | Electronics I                                   | 3         |
| ECE 203                                  | Electrical Circuits Laboratory                  | 1         |
| ECE 206                                  | Circuits, Signals, and Systems                  | 3         |
| ECE 211                                  | Logic Design                                    | 3         |
| MTH 210                                  | Introduction to Linear Algebra                  | 3         |
| CHM 151                                  | Chemistry for Engineers                         | 3         |
| CHM 153                                  | Chemistry Laboratory for Engineers              | 1         |
| <b>Credit Hours</b>                      |   | <b>17</b> |
| <b>Junior Year</b>                       |   |           |
| <b>Fall</b>                              |   |           |
| ECE 302                                  | Electronics II                                  | 3         |
| ECE 303                                  | Electronics Laboratory                          | 1         |
| ECE 315                                  | Digital Design Laboratory                       | 1         |
| ECE 336                                  | Discrete-Time Signals and Systems               | 3         |
| ECE 310                                  | Introduction to Engineering Probability         | 3         |
| MMI 502                                  |   | 3         |
| People and Society Cognate <sup>1</sup>  |   | 3         |
| <b>Credit Hours</b>                      |   | <b>17</b> |
| <b>Spring</b>                            |   |           |
| ECE 212                                  | Processors: Hardware, Software, and Interfacing | 3         |
| ECE 316                                  | Structured Digital Design                       | 1         |
| ECE 436                                  | Digital Signal Processing                       | 3         |
| EE Core Elective <sup>1</sup>            |   | 3         |
| MMI 172                                  |   | 1         |
| MMI 503                                  |   | 3         |
| People and Society Cognate <sup>1</sup>  |   | 3         |
| <b>Credit Hours</b>                      |   | <b>17</b> |
| <b>Senior Year</b>                       |   |           |
| <b>Fall</b>                              |   |           |
| ECE 481                                  | Senior Project I                                | 1         |

|  |                                     |            |
|--|-------------------------------------|------------|
| ECE Design Elective <sup>1</sup>                       |                                     | 3          |
| Audio Engineering or Technical Elective <sup>1</sup>   |                                     | 3          |
| ECE 602  | Engineering Acoustics               | 3          |
| Audio Engineering or Technical Elective <sup>1,3</sup> |                                     | 3          |
| People and Society Cognate <sup>1</sup>                |                                     | 3          |
| <b>Credit Hours</b>                                    |                                     | <b>16</b>  |
| <b>Spring</b>  |                                     |            |
| MMI 501  |                                     | 3          |
| MMI 503  |                                     | 3          |
| ECE 640  | Digital Speech and Audio Processing | 3          |
| ECE 600 Level Elective <sup>1</sup>                    |                                     | 3          |
| Arts and Humanities Cognate <sup>1</sup>               |                                     | 3          |
| Arts and Humanities Cognate <sup>1</sup>               |                                     | 3          |
| <b>Credit Hours</b>                                    |                                     | <b>18</b>  |
| <b>Fifth Year</b>                                      |                                     |            |
| <b>Fall</b>  |                                     |            |
| ECE 715  | M.S. Design Project I               | 3          |
| ECE 600 Level Elective                                 |                                     | 3          |
| ECE 700 Level Elective                                 |                                     | 3          |
| <b>Credit Hours</b>                                    |                                     | <b>9</b>   |
| <b>Spring</b>  |                                     |            |
| ECE 716  | M.S. Design Project II              | 3          |
| ECE 600 Level Elective                                 |                                     | 3          |
| ECE 700 Level Elective                                 |                                     | 3          |
| <b>Credit Hours</b>                                    |                                     | <b>9</b>   |
| <b>Total Credit Hours</b>                              |                                     | <b>152</b> |

<sup>1</sup> See description of electives under the Departmental Electives Section.  
<sup>2</sup> Offered only in the Fall semester.  
<sup>3</sup> Should be taken as Graduate (G) credits