CASE SCHOOL OF ENGINEERING
CASE WESTERN RESERVE UNIVERSITY

## ELECTRICAL ENGINEERING

# Dual Degree Program Course Requirements

| Engineering Requirements for all majors/departments | | |
|---|---|---|
| **Course Code** | **Course Title** | **Semester Credit Hours** |
| CHEM 105 | Principles of Chemistry I | 3 |
| CHEM 106 | Principles of Chemistry II | 3 |
| CHEM 113 | Principles of Chemistry Lab | 2 |
| ENGR 131 | Elementary Computer Programming (JAVA) | 3 |
| MATH 121 | Calculus for Science and Engineering I | 4 |
| MATH 122 | Calculus for Science and Engineering II | 4 |
| MATH 223 | Calculus for Science and Engineering III | 3 |
| MATH 224 | Elementary Differential Equations | 3 |
| PHYS 121 | General Physics I | 4 |
| PHYS 122 | General Physics II | 4 |
| | Humanities and Social Science<br>(including college level writing proficiency) | 22 |
| | Physical Education (2 semesters) | 0 |
| | | **55** |

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The Electrical Engineering Department recommends that the following courses be taken prior to beginning the Dual Degree Program at Case Western Reserve University. If the courses cannot be fulfilled, they will be integrated into the curriculum, which may possibly extend the program timeline.

## Recommended Engineering Courses for Electrical Engineering

| Course Code | Course Title | Semester Credit Hours | Description |
|---|---|---|---|
| EECS 309 | Electromagnetic Fields I | 3 | Maxwell's integral and differential equations, boundary conditions, constitutive relations, energy conservation and Pointing vector, wave equation, plane waves, propagating waves and transmission lines, characteristic impedance, reflection coefficient and standing wave ratio, in-depth analysis of coaxial and strip lines, electro- and magneto-quasistatics, simple boundary value problems, correspondence between fields and circuit concepts, energy and forces. Prereq: MATH 223 and PHYS 122. Coreq: MATH 224. |
| ENGR 210 | Introduction to Circuits and Instrumentation | 4 | Modeling and circuit analysis of analog and digital circuits. Fundamental concepts in circuit analysis: voltage and current sources; Kirchhoff's Laws; Thevenin and Norton equivalent circuits, inductors capacitors, and transformers; modeling sensors and amplifiers and measuring DC device characteristics; characterization and measurement of time dependent waveforms; transient behavior of circuits; frequency dependent behavior of devices and amplifiers; frequency measurements; AC power and power measurements; noise in real electronic systems; electronic devices as switches; digital logic circuits; introduction to computer interfaces; and analog/digital systems for measurement and control. Prereq: MATH 122. Coreq: PHYS 122. |
| STAT 332 | Statistics of Signal Processing | 3 | For advanced undergraduate students or beginning graduate students in engineering, physical sciences, life sciences. Introduction to probability models and statistical methods. Emphasis on probability as relative frequencies. Derivation of conditional probabilities and memoryless channels. Joint distribution of random variables, transformations, autocorrelation, series of irregular observations, stationarity. Random harmonic signals with noise, random phase and/or random amplitude. Gaussian and Poisson signals. Modulation and averaging properties. Transmission through linear fi lters. Power spectra, bandwidth, white and colored noise. ARMA processes and forecasting. Optimal linear systems, signal-to-noise ratio, Wiener filter. Completion of additional assignments required from graduate students registered in this course. Prereq: MATH 122. |

## Sample Course Sequence for Electrical Engineering

Fall Year 1

| Subject Code | Course Number | Course Title | Hours per Week | | Semester Credit Hours |
|---|---|---|---|---|---|
| | | | Class | Lab | |
| ENGL | 398N | Professional Communication | 3 | 0 | 3 |
| ENGR | 210 | Circuits and Instrumentation | 3 | 2 | 4 |
| EECS | 281 | Computer Org. Logic Design | 3 | 2 | 4 |
| EECS | 246 | Signals and Systems | 3 | 2 | 4 |
| STAT | 332 | Statistics of Signal Processing | 3 | 0 | 3 |
| | | | 15 | 6 | 18 |

Spring Year 1

| Subject Code | Course Number | Course Title | Hours per Week | | Semester Credit Hours |
|---|---|---|---|---|---|
| | | | Class | Lab | |
| ENGR | 225 | Thermo, Fluid Dynamics, Heat & Mass Transfer | 4 | 0 | 4 |
| EECS | 245 | Circuits, Signals and Systems I | 3 | 2 | 4 |
| EECS | 321 | Semiconductor Elect. Devices | 3 | 2 | 4 |
| ENGR | 200 | Statics and Strength of Materials | 3 | 0 | 3 |
| | | | 13 | 4 | 15 |

Fall Year 2

| Subject Code | Course Number | Course Title | Hours per Week | | Semester Credit Hours |
|---|---|---|---|---|---|
| | | | Class | Lab | |
| EECS | 398 | Senior Project Lab I | 0 | 8 | 4 |
| EECS | 351 | Communications and Signal Analysis | 3 | 0 | 3 |
| | | ***(or) EECS 354 Digital Communications*** | ***3*** | ***0*** | ***3*** |
| | | Approved Technical Elective | 3 | 0 | 3 |
| | | Approved Technical Elective | 3 | 0 | 3 |
| | | | 9 | 8 | 13 |

Spring Year 2

| Subject Code | Course Number | Course Title | Hours per Week | | Semester Credit Hours |
|---|---|---|---|---|---|
| | | | Class | Lab | |
| EECS | 399 | Senior Project Lab II | 0 | 8 | 4 |
| | | Approved Technical Elective | 3 | 0 | 3 |
| | | Approved Technical Elective | 3 | 0 | 3 |
| | | Approved Technical Elective | 3 | 0 | 3 |
| | | Approved Technical Elective | 3 | 0 | 3 |
| | | | 12 | 8 | 16 |

***Please Note***: The course sequence serves as an example of the classes necessary to complete the Dual Degree Program. Courses and the semesters taken will be based on the student's transfer credit and discussion with the Case Western Reserve University faculty advisor.