

Electrical Engineering

Department Information

- **Department Location:**
Electrical and Computer Engineering
- **Department Phone:**
701-231-7019
- **Department Web Site:**
www.ndsu.edu/ece/
- **Degrees Offered:**
B.S.E.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/electrical-engineering/

Electrical Engineering Major

The Bachelor of Science degree in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

EE Specialization

The Electrical Engineering program is designed to reflect the broad nature of the field, and students may tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests. Technical areas include the following:

- **Biomedical Engineering** is firmly based in engineering and the life sciences. The integration of medicine and engineering serves to provide appropriate products, tools, and techniques for research diagnosis and treatment by health care professionals. Some important products are artificial hearts, medical imaging (MRI, ultrasound, CT scans), prosthetic devices, and computer aids for diagnosis. Biomedical engineers help identify the problems and needs that can be solved using engineering technology and systems methodology to provide high-quality health care at reasonable cost.
- **Communication and Signal Processing** are closely related fields within electrical engineering. Communication is the process of transferring information from one point in time and space to another point. Signal processing involves signal representation, as well as signal design and filtering. Students with this specialization find challenging opportunities worldwide to meet the need for more convenient, inexpensive, and reliable communication and signal processing.
- **Computer Engineering** involves both hardware and software for small and large computers and for all products that include dedicated computers within, such as smart phones, game consoles, and automobiles.
- **Control Engineering** deals with the design and implementation of algorithms for controlling physical systems. Examples include active suspension for cars, auto pilots for aircraft, and robot motion control.
- **Electromagnetics** includes electromagnetic compatibility, fiber optics, antennas, microwave devices, radar, sonar, satellite systems, power and communication transmission lines, grounding, shielding, and propagation.
- **Electronics and Microelectronics** deal with integrated circuits, VLSI, transistors, lasers, consumer electronics, defense electronics, power electronics, and electronic materials.
- **Optical Engineering**, developed jointly with the Department of Physics (<https://www.ndsu.edu/physics>), prepares future engineers in such areas as quantum theory; coherent/incoherent polarized/non-polarized light; geometric, physical, and Fourier optics; holography; and image processing and acquisition.
- **Power Systems** deals with the generation, transmission, distribution, and utilization of electric energy subject to safety, environmental, and economic concerns.
- **Nanotechnology** deals with the study of electric materials at the nanoscale level for applications such as solar cells and sensors.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	Credits	Spring	Credits
CHEM 121	3	ECE 111 ¹	3
Wellness Gen Ed	2	ENGL 120	3

ECE 173	4	MATH 129	3
ENGL 110	4	MATH 166	4
MATH 165	4	PHYS 251	4
	17		17
Sophomore			
Fall	Credits	Spring	Credits
EE 206	4	COMM 110	3
MATH 265	4	ECE 311	4
PHYS 252	4	MATH 266	3
ECE 275	4	Tech Elective	3
Gen Ed Science Lab	1	Humanities/Fine Arts Gen Ed	3
	17		16
Junior			
Fall	Credits	Spring	Credits
ECE 320	3	ECE 341	3
ECE 321	2	ECE 401	1
ECE 376	4	ECE 331	4
ECE 351	4	Tech Elective	3
ENGL/Upper Level Writing Gen Ed ³	3	ECE 343	4
	16		15
Senior			
Fall	Credits	Spring	Credits
ECE 403	2	ECE 405	3
ENGR 402	1	ECE Elective	3
ECE Elective	3	ECE Elective	3
Tech Elective	3	Humanities/Fine Arts Gen Ed ²	3
Social/Behavioral Sciences Gen Ed ⁴	3	Tech Elective	3
Social/Behavioral Sciences Gen Ed ⁴	3		
	15		15

Total Credits: 128

- ¹ Students must take ECE 111 prior to enrolling in ECE courses listed above in the Junior and Senior year; otherwise, students must take an additional ECE Elective in lieu of ECE 111.
- ² Suggested to take ENGR 311.
- ³ Select from ENGL 320, 321, 324 or 459 to satisfy the Upper Level Writing for General Education.
- ⁴ Suggested to take either ENGR 312, ECON 105, ECON 201, or ECON 202.

PROGRAM NOTES:

ECE Elective: any didactic ECE 4xx course (not x93, 494, 496).

Tech Elective: ECE 374, any didactic ECE 4xx course, ECE x93 or 494 (max 6 credits total between x93 and 494), ECE 496 (max 3 credits), or any course from accompanying list.

Students must earn a "C" or better in ECE 173, ECE 275, EE 206 and all required MATH courses, before enrolling in ECE courses listed above in the Junior or Senior years.