

Electrical Engineering Major

Major Requirements

Degree Type: B.S.E.E.

Minimum Credits Required: 126

University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (<https://catalog.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/>) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in residence at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (<https://catalog.ndsu.edu/academic-policies/undergraduate-policies/general-education/>).

Code	Title	Credits
Category C: Communication		12
Category R: Quantitative Reasoning		3
Category S: Science and Technology		10
Category A: Humanities and Fine Arts		6
Category B: Social and Behavioral Sciences		6
Category W: Wellness		2
Category D: Cultural Diversity		
Category G: Global Perspectives		
Category L: Digital Literacy		
Total Credits		39

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements ¹		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing ²	4
ECE 211	Circuit Analysis I	4
ECE 275	Digital Design ²	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	4
ECE 331	Energy Conversion	4
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 351	Applied Electromagnetics	4
ECE 376	Embedded Systems	4
ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3
MATH Courses Required		

MATH 129	Basic Linear Algebra ²	3
MATH 165	Calculus I ²	4
MATH 166	Calculus II ²	4
MATH 265	Calculus III (w/ vectors) ²	4
MATH 266	Introduction to Differential Equations ²	3
Other Courses Required		
CHEM 121	General Chemistry I	3
ENGR 327	Ethics, Engineering, and Technology	3
PHYS 251	University Physics I	4
PHYS 252	University Physics II	4
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Select one of the following lab courses:		1
CHEM 121L	General Chemistry I Laboratory	
PHYS 251L	University Physics I Laboratory	
PHYS 252L	University Physics II Laboratory	
ECE Electives		
Select 9 credits of ECE 4XX level prefix electives. Includes the cross listed courses of ECE 427/IME 427; ECE 429/IME 429; ECE 411/PHYS 411; & ECE 411L/PHYS 411L (excluding 494 and 496).		9
Tech Electives		
Select 12 credits from the following:		12
ABEN 456	Biobased Energy	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	
BIOL 315 & 315L	Genetics and Genetics Laboratory	
CE 309 & CE 310	Fluid Mechanics and Fluid Mechanics Laboratory	
CE/ME 486	Nanotechnology and Nanomaterials	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	
CHEM 364	Physical Chemistry I	
CHEM 365 & CHEM 471	Physical Chemistry II and Physical Chemistry Laboratory	
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	
CSCI 161	Computer Science II	
CSCI 222	Discrete Mathematics	
CSCI 336	Theoretical Computer Science	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 459	Foundations of Computer Networks	

CSCI 467	Algorithm Analysis
CSCI 474	Operating Systems Concepts
CSCI 477	Object-Oriented Systems
ECE 374	Computer Organization
ECE 375	Digital Design 2
ECE 494	(max. of 6 cr.)
ECE 4XX	Any ECE 400 level didactic course
ECE 496	(max. of 3 cr.)
ENGR 310	Entrepreneurship for Engineers and Scientists
IME 440	Engineering Economy
IME 456	Program and Project Management
IME 461	Quality Assurance and Control
MATH 270	Introduction to Abstract Mathematics
MATH 420	Abstract Algebra I
MATH 421	Abstract Algebra II
MATH 429	Topics in Linear Algebra
MATH 450	Real Analysis I
MATH 452	Complex Analysis
MATH 480	Applied Differential Equations
MATH 481	Fourier Analysis
MATH 483	Partial Differential Equations
MATH 488	Numerical Analysis
ME 221	Engineering Mechanics I
ME 222	Engineering Mechanics II
ME 223	Mechanics of Materials
ME 350	Thermodynamics and Heat Transfer
ME 470	Renewable Energy Technology
MICR 445	Animal Cell Culture Techniques
PHYS 350	Modern Physics
PHYS 360	Modern Physics II
PHYS 413	Lasers for Scientists and Engineers
PHYS 415	Elements of Photonics
PHYS 485	Quantum Mechanics I
STAT 450	Stochastic Processes
STAT 468	Probability and Mathematical Statistics II

Total Credits**105**

- ¹ Students must complete all of the courses listed in the Electrical Engineering Core Requirements section with a 2.00 GPA.
- ² No grade less than a 'C' is accepted in these courses and before enrolling in ECE 3XX level prefix courses, excluding ECE 311.

Degree Requirements and Notes

- For students interested in pursuing one of the areas of specialization, lists of recommendations for specific electives are available from the ECE department. Courses not listed on the curriculum will require a substitution form to be submitted to the Office of Registration and Records for degree progress.