Electrical Engineering

Department Information

· Department Location:

Electrical and Computer Engineering

· Department Phone:

701-231-7019

· Department Web Site:

www.ndsu.edu/ece/

· Credential Offered:

BSFF

· Plan Of Study Sample:

bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering/#planofstudytext

Major Requirements

Major: Electrical Engineering

Degree Type: B.S.E.E.

Minimum Degree Credits to Graduate: 128

University Degree Requirements

- 1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
- 2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
- 3. Satisfactory completion of the general education requirements as specified by the university.
- 4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
- 5. At least 36 credits presented for graduation must be in courses number 300 or higher.
- 6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institituion.
 - a. Of these 60, at least 36 must be NDSU residence credits as defined in #7.
- b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
- 7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (http://bulletin.ndsu.edu/past-bulletin-archive/2019-20/academic-policies/undergraduate-policies/degree-and-graduation) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B)		6
Wellness (W) [†]		2
Cultural Diversity (D) *†		
Global Perspectives (G) *†		
Total Credits		39

- * May be satisfied by completing courses in another General Education category.
- General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

• A list of university approved general education courses and administrative policies are available here (http://bulletin.ndsu.edu/past-bulletin-archive/2019-20/academic-policies/undergraduate-policies/general-education/#genedcoursestext).

Major Requirements

Code Title Code Electrical Electrical Electrical Electrical Electrical Electrical Electrical Electrical Engineering 3 ECE 173 Introduction to Computing 4 ECE 275 Digital Design 4 ECE 331 Circuit Analysis II 4 ECE 331 Electronics for Electrical Engineers 2 ECE 331 Electronics for Electrical Engineers 2 ECE 331 Energy Conversion 4 ECE 341 Random Processes 3 ECE 343 Signals & Systems 4 ECE 341 Applied Electromagnetics 4 ECE 362 Applied Electromagnetics 4 ECE 363 Applied Electromagnetics 4 ECE 361 Applied Electromagnetics 4 ECE 362 Applied Electromagnetics 4 ECE 401 Design II (Capstone) 2 ECE 402 Design III (Capstone) 3 MATH 126 Calculus II (May satisfy general education category R) 4 MATH 126 Calculus II (May satisfy General education category S)	major resquironiones		
ECE 111 Introduction to Electrical and Computer Engineering 3 ECE 275 Digital Design 4 ECE 311 Circuit Analysis II 4 ECE 312 Electronics for Electrical Engineers 2 ECE 321 Electronics for Electrical Engineers 2 ECE 321 Electronics for Electrical Engineers 2 ECE 331 Energy Comments 3 ECE 341 Random Processes 3 ECE 343 Signals & Systems 4 ECE 351 Applied Electronical Companies 4 ECE 352 Embedded Systems 4 ECE 401 Design II (Lapstone) 2 ECE 402 Design III (Lapstone) 2 ECE 403 Design III (Lapstone) 3 MATH 129 Basic Linear Algebra* 3 MATH 129 Basic Linear Algebra* 4 MATH 156 Calculus II (May satisfy general education category R) 4 MATH 1256 Calculus III (May satisfy general education category S) 3 ELE 206 Circuit Analysis I	Code	Title	Credits
ECE 173		ements	
ECE 275 Digital Design 4			3
ECE 311 Circuit Analysis II 4 ECE 320 Electronics for Computer Engineers 3 ECE 321 Electronics for Electrical Engineers 2 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 II (capstone) 2 ECE 403 Design II (capstone) 2 ECE 405 Design II (capstone) 3 MATH 129 Basic Linear Algebra* 3 MATH 195 Calculus II (May satisfy general education category R) 4 MATH 166 Calculus II (May satisfy general education category R) 4 MATH 265 Calculus II (May satisfy general education category S) 3 MEED 30 Circuit Analysis I* 3 MEED 40 Circuit Analysis I* 4 MEM T1 25 Calculus II (May satisfy general education category S) 4 MEN 220 Business and Process	ECE 173	Introduction to Computing *	4
ECE 320 Electronics for Computer Engineers 3 ECE 321 Electronics for Electrical Engineers 4 ECE 341 Random Processes 3 ECE 342 Signals & Systems 4 ECE 376 Applied Electromagnetics 4 ECE 376 Embedded Systems 4 ECE 401 Design II (capstone) 1 ECE 403 Design II (capstone) 2 ECE 406 Design II (capstone) 3 MATH 207 Basic Linear Algebra 3 MATH 208 Basic Linear Algebra 3 MATH 209 Basic Linear Algebra 3 MATH 266 Calculus II (My vectors)* 4 MATH 265 Calculus III (Wy vectors)* 4 MATH 266 Introduction to Differential Equations * 3 Other Courses Required 3 WHAT 126 General Chemistry I (May satisfy general education category S) 3 EVE 206 Circuit Analysis I* 4 Select one of the following: (May satisfy general education category S) 4 <td< td=""><td>ECE 275</td><td>Digital Design *</td><td>4</td></td<>	ECE 275	Digital Design *	4
ECE 321 Electronics for Electrical Engineers 2 ECE 331 Energy Conversion 3 ECE 341 Random Processes 3 ECE 343 Signals & Systems 4 ECE 351 Applied Electromagnetics 4 ECE 376 Embedded Systems 4 ECE 401 Design II (capstone) 1 ECE 403 Design III (capstone) 3 MATH Courses Required 3 MATH 165 Calculus I (May satisfy general education category R) 4 MATH 165 Calculus II (Wy vectors)* 4 MATH 266 Introduction to Differential Equations* 3 Other Courses Required 6 4 CHEM 121 General Chemistry I (May satisfy general education category S) 3 EE 206 Circuit Analysis I* 4 Select one of the following: (May satisfy general education category S) 3 EE 206 Circuit Analysis I* 4 ENGL 320 Business and Professional Writing 4 ENGL 321 Writing in the Technical Professions 4	ECE 311	Circuit Analysis II	4
ECE 331 Energy Conversion 4	ECE 320	Electronics for Computer Engineers	3
ECE 341 Random Processes 3 ECE 343 Signals & Systems 4 ECE 351 Applied Electromagnetics 4 ECE 376 Embedded Systems 4 ECE 401 Design II (capstone) 2 ECE 403 Design III (capstone) 2 ECE 405 Design III (capstone) 3 MATH 165 Calculus I (May satisfy general education category R) 4 MATH 166 Calculus II (My vectors)* 4 MATH 265 Calculus III (Wy vectors)* 4 MATH 266 Introduction to Differential Equations* 3 MATH 266 Calculus III (Wy vectors)* 4 MED 206 Crout Analysis I* 4 MATH 266 Calculus III (Wy vectors)* 3 Select one of the following: (May satisfy general education category S) 3 EE 206 Crout Analysis I* 4 Select one of the following: (May satisfy general education category S) 3 ENGL 321 Writing in the Technical Professions ENGL 429 Researching and Writing Grant and Proposal	ECE 321	Electronics for Electrical Engineers	2
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ECE 376	ECE 343	Signals & Systems	4
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Tech Electives: Select 12 credits from the following: ABEN 456 Biobased Energy BIOL 150 General Biology I & 150L and General Biology I Laboratory BIOL 220 Human Anatomy and Physiology I & 220L and Human Anatomy and Physiology I Laboratory BIOL 221 Human Anatomy and Physiology II & 221L and Human Anatomy and Physiology II Laboratory BIOL 315 Genetics	ECE Electives	Select 9 credits of ECE 400 level electives (excluding 494 and 496)	9
ABEN 456 Biobased Energy BIOL 150 General Biology I & 150L and General Biology I Laboratory BIOL 220 Human Anatomy and Physiology I & 220L and Human Anatomy and Physiology I Laboratory BIOL 221 BIOL 221 Anatomy and Physiology II A 221L BIOL 315 Genetics	Includes the cross listed course	s of ECE 427/IME 427; ECE 429/IME 429; ECE 411/PHYS 411; & ECE 411L/PHYS 411L	
ABEN 456 Biobased Energy BIOL 150 General Biology I & 150L and General Biology I Laboratory BIOL 220 Human Anatomy and Physiology I & 220L and Human Anatomy and Physiology I Laboratory BIOL 221 BIOL 221 Anatomy and Physiology II A 221L BIOL 315 Genetics	Tech Electives: Select 12 credits from	om the following:	12
BIOL 150 & 150L and General Biology I and General Biology I Laboratory BIOL 220 Human Anatomy and Physiology I & 220L BIOL 221 Human Anatomy and Physiology II & 221L and Human Anatomy and Physiology II Laboratory BIOL 315 Genetics			
BIOL 220	BIOL 150		
 & 220L and Human Anatomy and Physiology I Laboratory BIOL 221 Human Anatomy and Physiology II & 221L and Human Anatomy and Physiology II Laboratory BIOL 315 Genetics 	& 150L	and General Biology I Laboratory	
BIOL 221 Human Anatomy and Physiology II & 221L and Human Anatomy and Physiology II Laboratory BIOL 315 Genetics	BIOL 220	Human Anatomy and Physiology I	
& 221L and Human Anatomy and Physiology II Laboratory BIOL 315 Genetics	& 220L	and Human Anatomy and Physiology I Laboratory	
BIOL 315 Genetics		r e e	
& 313L and Genetics Laboratory			
	& 313L	and Genetics Laboratory	

CE 309	Third Mark anian
& CE 310	Fluid Mechanics and Fluid Mechanics Laboratory
CE/ME 486	Nanotechnology and Nanomaterials
CHEM 122	General Chemistry II
& 122L	and General Chemistry II Laboratory
CHEM 341	Organic Chemistry I
& 341L	and Organic Chemistry I Laboratory
CHEM 342	Organic Chemistry II
& 342L	and Organic Chemistry II Laboratory
CHEM 364	Physical Chemistry I
CHEM 365 & CHEM 471	Physical Chemistry II and Physical Chemistry Laboratory
CHEM 425	Inorganic Chemistry I
& CHEM 429	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 458	Computer Graphics
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 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 MATH 421	Abstract Algebra I Abstract Algebra II
MATH 429	Topics in Linear Algebra
MATH 450	Real Analysis I
MATH 451	Real Analysis II
MATH 452	Complex Analysis
MATH 480	Applied Differential Equations
MATH 481	Fourier Analysis
MATH 483	Partial Differential Equations
MATH 488	Numerical Analysis I
MATH 489	Numerical Analysis II
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

4 Electrical Engineering

Total Credits		104
Z00 460	Animal Physiology	
STAT 468	Probability and Mathematical Statistics II	
STAT 450	Stochastic Processes	
PHYS 485	Quantum Mechanics I	
PHYS 415	Elements of Photonics	
PHYS 413	Lasers for Scientists and Engineers	

^{*} No grade less than a C accepted in these courses and before enrolling in ECE 300 level courses, excluding ECE 311.

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- In order to graduate, an ECE student must have at least a 2.0 GPA in all required EE and ECE courses taken at NDSU. Elective ECE courses are not included in this GPA requirement.
- Transfer Students Transfer courses with grades less than 'C' in Biology, Chemistry, Computer Science, Mathematics, Physics, and any type of engineering class will not be accepted as a major requirement.
- All Students Students are required to attain a grade of 'C' or better in ECE 173 Introduction to Computing, ECE 275 Digital Design, EE 206 Circuit Analysis I, and all required MATH courses.

Note: For students interested in pursuing one of the areas of specialization, lists of recommendations for specific electives are available from the ECE Department (https://www.ndsu.edu/ece).