COMPUTER ENGINEERING DEGREE

Students must also complete the Undergraduate Registration Requirement (https://catalogs.northwestern.edu/undergraduate/requirements-policies/undergraduate-registration-requirement/) and the degree requirements of their home school.

Requirements (48 units)

Core Courses (27 units) [1]

Course	Title
4 mathematics courses (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext)	
4 units of basic science:	
PHYSICS 135-2 & PHYSICS 135-3	General Physics and General Physics
PHYSICS 136-2 & PHYSICS 136-3	General Physics Laboratory and General Physics Laboratory
1.33 units chosen from McCormick-approved basic science categories of Chemistry, Physics, Biological Science, Earth & Planetary Science or Astronomy (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext) [2]	
4 engineering analysis and computer proficiency courses (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext)	
3 design and communication courses (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext)	
7 social sciences/humanities courses (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext)	
5 unrestricted electives (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext)	

Major Program (21 units)

Course	Title
10 required courses	
COMP_ENG 203-0	Introduction to Computer Engineering
COMP_ENG 205-0	Fundamentals of Computer System Software
COMP_ENG 303-0	Advanced Digital Design
COMP_ENG 361-0	Computer Architecture I
COMP_SCI 111-0	Fundamentals of Computer Programming
COMP_SCI 211-0	Fundamentals of Computer Programming II
ELEC_ENG 202-0	Introduction to Electrical Engineering
ELEC_ENG 302-0	Probabilistic Systems
ELEC_ENG 221-0	Fundamentals of Circuits
1 additional course from a McCormick department at 200-level or higher comprised of 100% Engineering Topics based on ABET Course Partitioning Table	
10 technical elective courses	
2 courses chosen from the options below	
COMP_SCI 213-0	Introduction to Computer Systems
ELEC_ENG 222-0	Fundamentals of Signals & Systems
ELEC_ENG 223-0	Fundamentals of Solid State Engineering
ELEC_ENG 224-0	Fund of Electromagnetics & Photonics
ELEC_ENG 225-0	Fundamentals of Electronics
5 courses from the areas below	
Architecture and high-performance computing (see below)	
VLSI and CAD (see below)	
Embedded systems (see below)	
Software systems (see below)	
Networks and security (see below)	
3 elective courses chosen from the options below	
300-level technical courses in science, mathematics, computer science, or engineering [3]	
BIOL_SCI 201-0	Molecular Biology
BIOL_SCI 202-0	Cell Biology
BIOL_SCI 203-0	Genetics and Evolution
CHEM 215-1 & CHEM 215-2 & CHEM 215-3	Organic Chemistry I and Organic Chemistry II and Organic Chemistry III
1 design course chosen from the options below	
COMP_ENG 347-1	Microprocessor Systems Project I
COMP_ENG 362-0	Computer Architecture Projects
COMP_ENG 392-0	VLSI Systems Design Projects

1 See general requirements (https://catalogs.northwestern.edu/undergraduate/engineering-applied-science/#requirementstext) for details.

2 PHYSICS 125-2 General Physics for ISP or PHYSICS 140-3 Fundamentals of Physics may be substituted for PHYSICS 135-2 General Physics. PHYSICS 125-3 General Physics for ISP or PHYSICS 140-3 Fundamentals of Physics may be substituted for PHYSICS 135-3 General Physics. Associated labs are PHYSICS 126-2 Physics Laboratory for ISP or PHYSICS 136-2 General Physics Laboratory and PHYSICS 126-3 Physics Laboratory for ISP or PHYSICS 136-3 General Physics Laboratory.

3 No more than 2 units of COMP_ENG 399-0 Projects will be counted as technical electives. Additional units of COMP_ENG 399-0 Projects may be taken but will be counted as unrestricted electives.

Area Electives

Architecture and High-Performance Computing

Course	Title
COMP_ENG 329-0	The Art of Multicore Concurrent Programming
COMP_ENG 358-0	Introduction to Parallel Computing
COMP_ENG 362-0	Computer Architecture Projects
COMP_ENG 368-0	Programming Massively Parallel Processors with CUDA
COMP_ENG 452-0	Adv Computer Architecture
COMP_ENG 453-0	Parallel Architectures
COMP_ENG 468-0	Programming Massively Parallel Processors with CUDA

VLSI and CAD

Course	Title
COMP_ENG 355-0	ASIC and FPGA Design
COMP_ENG 357-0	Design Automation in VLSI
COMP_ENG 387-0	Real-Time Digital Systems Design and Verification with FPGAs
COMP_ENG 391-0	CMOS VLSI Circuit Design
COMP_ENG 392-0	VLSI Systems Design Projects
COMP_ENG 393-0	Advanced Low Power VLSI and Mixed-signal IC Design
COMP_ENG 459-0	VLSI Algorithmics
COMP_ENG 493-0	Advanced Low Power VLSI and Mixed-signal IC Design
ELEC_ENG 353-0	Digital Microelectronics

Embedded Systems

Course	Title
COMP_ENG 346-0	Microprocessor System Design
COMP_ENG 347-1	Microprocessor Systems Project I
COMP_ENG 347-2	Microprocessor Systems Project II
COMP_ENG 364-0	CyberPhysical Systems Design and Application
COMP_ENG 365-0	Internet-of-things Sensors, Systems, And Applications
COMP_ENG 366-0	Embedded Systems
COMP_ENG 369-0	Introduction to Sensor Networks
COMP_ENG 464-0	Cyber-Physical Systems Design and Application
COMP_ENG 465-0	Internet-of-things Sensors, Systems, And Applications
COMP_ENG 466-0	Embedded Systems
COMP_SCI 301-0	Introduction to Robotics Laboratory
ELEC_ENG 326-0	Electronic System Design I
ELEC_ENG 327-0	Electronic System Design II: Project
ELEC_ENG 332-0	Introduction to Computer Vision
ELEC_ENG 360-0	Introduction to Feedback Systems
ELEC_ENG 390-0	Introduction to Robotics
ELEC_ENG 432-0	Advanced Computer Vision
MECH_ENG 333-0	Introduction to Mechatronics
MECH_ENG 433-0	Advanced Mechatronics

Software Systems

Course	Title
COMP_SCI 150-0	Fundamentals of Computer Programming 1.5
COMP_SCI 212-0	Mathematical Foundations of Comp Science
COMP_SCI 214-0	Data Structures & Algorithms
COMP_SCI 321-0	Programming Languages
COMP_SCI 322-0	Compiler Construction
COMP_SCI 336-0	Design & Analysis of Algorithms
COMP_SCI 339-0	Introduction to Database Systems
COMP_SCI 343-0	Operating Systems
COMP_SCI 394-0	Agile Software Development

Networks and Security

Course	Title
COMP_ENG 334-0	Fundamentals of Blockchains and Decentralization
COMP_SCI 340-0	Introduction to Networking
COMP_SCI 350-0	Introduction to Computer Security
COMP_SCI 354-0	Computer System Security
ELEC_ENG 333-0	Introduction to Communication Networks