COMPUTER ENGINEERING, BS

The Bachelor of Science in Computer Engineering program at the University of Alabama is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs.

This program gives students a broad knowledge of the software and hardware components of modern computing and cyber-physical systems, detailed computer-systems design, and the role of computer systems in various engineering disciplines. Students completing the program will be prepared for a computer-oriented engineering career with emphasis on design and applications of embedded computing systems.

Graduates with a Computer Engineering BS degree commonly begin their careers in a variety of functions including: hardware engineers, software engineers, computer systems analysts, computer support specialists, network system & data managers, communication analysts, network & computer systems administrators, computer programmers, database administrators, operations research analysts, and computer & information scientists. These graduates also pursue post-graduate degrees in Computer Engineering, Computer Science, Electrical Engineering, Business & Commerce, and even professional areas such as Law and Medicine.

The information contained here describes the undergraduate curriculum in Computer Engineering. Graduate students and students participating in the Accelerated Masters Program (AMP) should consult the graduate catalog for information on all cross-listed and graduate-only courses. More information about various programs within the department is available in the Electrical and Computer Engineering departmental office located in 3027 SERC.

Program Educational Objectives

The Program Educational Objectives for the B.S. in Computer Engineering are:

- Graduates will excel in engineering careers and/or postgraduate education utilizing knowledge of Computer Engineering disciplines and underlying fundamental principles of science and mathematics, engineering analysis, problem solving, and design;
- Graduates will expand their knowledge of current and emerging issues in Computer Engineering and continue career-long professional development through engagement in lifelong learning;
- Graduates will grow professionally and advance throughout their engineering careers utilizing skills in effective communication; responsible, multidisciplinary teamwork, and adherence to principles of professional accountability and ethics.

Student Outcomes

Graduates of the Computer Engineering program will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
2. An ability to apply engineering design to produce solutions that meet specific needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
3. An Ability to communicate effectively with a range of audiences;
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies;
8. An ability to solve mathematics problems in probability, statistics, differential equations, linear algebra, complex variables, and discrete mathematics as they relate to problems in Computer Engineering.

The overall goal of the Computer Engineering program is to prepare students for engineering careers within the discipline. The first year and a half of the Computer Engineering curriculum includes basic courses in mathematics and physical science, broadening courses in humanities and social science, and foundation courses in engineering. The next three semesters provide the core education in Computer Engineering with courses in digital logic, microcomputers, computer programming, electronics, circuits, and systems. The last year of study includes two semesters of Capstone Design as well as required advanced courses in computer architecture and embedded systems (with its associated lab). Technical electives are available during the final year to allow students to concentrate in selected areas of the discipline. The department offers advanced courses in communications, controls, digital system design, and microelectronics.

To complete the senior-level electives, students must select one lecture with its associated lab (lecture/lab combination). This lecture/lab combination must be completed as a pair. Additional materials that describe the curriculum are available in the Electrical and Computer Engineering departmental office and on the Computer Engineering website.

Click here for details regarding the College of Engineering policy for repeating courses.

Click here for details regarding the College of Engineering Residency policy.

ECE 4xx-level lecture/lab combos must be taken as a pair (either both lecture and lab taken off-campus at the same institution as a pair and transferred in, or both taken at UA).

Credit hour substitutions for a course must come from a course within the same discipline (for example, a CS hour must be used to substitute for a missing CS hour). The course used as substitution cannot be used for any other Computer Engineering program requirement. This is accomplished through a petition to the ECE Department.

Click here for details regarding The University of Alabama's policy on auditing courses.

Freshman

Fall	Hours	Spring	Hours
CH 101	4	PH 105	4
MATH 125	4	MATH 126	4

	Hours		Hours
ECE 121 or ENGR 111 (Or other ENG intro courses)	1	ENGR 103 or 123	3
EN 101	3	EN 102	3
Humanities (HU), Literature (L), or Fine Arts (FA) Elective[1,2]	3		
	15		**14**
Sophomore			
Fall	**Hours**	**Spring**	**Hours**
PH 106	4	MATH 301	3
MATH 238	3	ECE 225	4
MATH 227	4	MATH 237	3
CS 100	4	ECE 380	4
		Humanities (HU), Literature (L), or Fine Arts (FA) Elective[1,2]	3
	15		**17**
Junior			
Fall	**Hours**	**Spring**	**Hours**
History (HI) or Social Behavioral Sciences (SB) Elective[1,2]	3	History (HI) or Social Behavioral Sciences (SB) Elective[1,2]	3
ECE 370	3	ECE 332	4
MATH 355	3	ECE 326	3
CS 101	4	CS 201	4
ECE 383	4		
	17		**14**
Senior			
Fall	**Hours**	**Spring**	**Hours**
Humanities (HU), Literature (L), or Fine Arts (FA) Elective[1,2]	3	History (HI) or Social Behavioral Sciences (SB) Elective[1,2]	3
ECE 333	4	ECE Restricted Area Elective[3]	3
ECE 492	2	ECE 494	2
Select one of the following lecture/lab combinations	4	ECE Restricted Area Elective or Professional Elective[3,4]	3
ECE 408 & ECE 409		ECE 486 & ECE 487	4
ECE 475 & ECE 476			
ECE 480 & ECE 481			
ECE 484	3		
	16		**15**

Total Hours: 123

Footnotes

[1]   Students must satisfy the College of Engineering in-depth requirement (minimum of six hours in one discipline).

[2]   The College of Engineering core curriculum requires a minimum of: nine hours of HU, L, or FA courses; nine hours of HI or SB courses; six hours of FC courses; six hours of W courses (300- and 400-level ECE courses); 12 hours of N courses (eight hours of calculus-based physics); 12 hours of MA courses (MATH 125 Calculus I or higher); and six hours of C or FL courses.

[3]   The ECE Restricted Area Elective must be chosen from the list approved by the Department of Electrical and Computer Engineering below.

[4]   The Professional Elective must be chosen from the list approved by the Department of Electrical and Computer Engineering below.

The table below lists approved **Restricted Area Electives**. The electives are grouped by suggested areas of study within Electrical and Computer Engineering. However, a student is free to choose any elective listed that does not duplicate other program requirements. Special topics courses such as ECE 491 and ECE 493 may also be approved by petition. Note that some transfer courses are not eligible as Restricted Area Electives.

Code and Title		Hours
Area 1: Software and Embedded Systems		
AEM 249	Algorithm Devl Implementation	3
CS 101	CS II for Majors	4
CS 200	Software Design & Engineering	4
CS 201	Data Structures and Algorithms	4
CS 202	Web Foundations	3
CS 300	Operating Systems	3
CS 301	Database Management Systems	3
CS 403	Programming Languages	3
CS 407	Software Interface Desgn	3
CS 434	Compiler Construction	3
CS 435	Computer Graphics	3
CS 451	Data Science	3
CS 460	Intro to Autonomous Robotics	3
CS 465	Artificial Intelligence	3
CS 470	Computer Algorithms	3
CS 480	Computer Simulation	3
ECE 408	Communications	3
ECE 409	Communications Lab	1
ECE 480	Digital Systems Design	3
ECE 481	Digital Systems Design Lab	1
ECE 482	Comp Visn Dig Image Proc	3
ECE 483	Intro to Machine Learning	3
ECE 484	Computer Architecture	3
ECE 486	Embedded Systems	3
ECE 487	Embedded Systems Laboratory	1
ECE 488	Computational Intelligence	3
ME 456	Mechatronics	3
Area 2: Electromechanical Systems		
ECE 451	Power Electronics	3
ECE 452	Power Electronics Laboratory	1
ECE 453	Power Systems	3
ECE 454	Power Systems Laboratory	1
ECE 455	Electromechanical Systems	3
ECE 475	Control Systems Analysis	3
ECE 476	Control Systems Lab	1
ECE 479	Digital Control Systems	3
ME 454	Auto. Elec. and Electron. Sys.	3
Areas 3 and 4: Materials and Devices; Electromagnetics		
ECE 430	Solid State Devices	3

ECE 438	Intgr Circuit Fabr Prin	3
ECE 439	Thin Film Technology	3
ECE 440	Electromagnetic Waves	3
ECE 462	Semiconductor Optoelectronics	3
ECE 463	Magnetic Materials & Devices	3
ECE 466	Fund of Nanotechnology	3
MTE 271	Engr Matls: Struc Prop	3
MTE 450	Plasma Proc of Thin Films	3
MTE 481	Analy Methods For Matls	4

Area 5: General Courses

Aeorspace Engineering and Mechanics – AEM 201, AEM 349

Mechanical Engineering – ME 215, ME 305, ME 349, ME 372

General Engineering Studies – GES 400

Mathematics (MATH) – All courses above MATH 238 not duplicating other courses required in the curriculum. Exceptions to this include courses with math education as the primary emphasis (e.g. MATH 403, MATH 405, MATH 409).

Music (MUS) – MUS 308, MUS 340, MUS 341, MUS 414

Physics (PH) – All courses 300 and above not duplicating other courses required in the curriculum.

The table below lists approved **Professional Electives**. A minimum of three credit hours of professional elective courses are required. Note that some transfer courses are not eligible as Professional Electives.

Code and Title	Hours
Culverhouse School of Accountancy (AC) – All courses.	
Aerospace Engineering and Mechanics (AEM) – All courses 200 and above.	
Air Force Studies (AFS) – All courses 300 and above.	
Astronomy (AY) – All courses 200 and above.	
Biological Sciences (BSC) – All courses.	
Chemical and Biological Engineering (CHE) – All courses 200 and above.	
Chemistry (CH) – All courses except CH 100, CH 101, and CH 117.	
Civil, Construction, and Environmental Engineering (CE) – All courses 200 and above.	
Randall Research Scholar (RRS) – All courses 200 and above.	
Computer Science (CS) – All courses 300 and above not duplicating other courses required in the curriculum.	
Economics (EC) – All courses 300 and above.	
English (EN) – EN 319.	
Finance (FI) – All courses.	
Foreign languages – All courses 300 and above not duplicating other program requirements.	
General Business Administration (GBA) – All courses.	
General Engineering Studies – All GES courses 200 and above not duplicating other courses required in the curriculum. ENGR 161 and ENGR 171.	
Geological Sciences (GEO) – All courses.	
International Honors Program (IHP) – All courses.	
Legal Studies (LGS) – All courses.	
Management (MGT) – All courses.	
Marine Science (MS) – All courses.	
Marketing (MKT) – All courses.	

Mathematics (MATH) – All courses above MATH 238 not duplicating other courses required in the curriculum. Exceptions to this include courses with math education as the primary emphasis (e.g. MATH 403, MATH 405, MATH 409).

Mechanical Engineering (ME) – All courses 200 and above.

Metallurgical Engineering (MTE) – All courses 200 and above.

Military Science (MIL) – All courses 300 and above.

Music (MUS) – MUS 308, MUS 340, MUS 341, MUS 414

Physics (PH) – All courses 300 and above not duplicating other courses required in the curriculum.

Statistics (ST) – All courses.

Computer Engineering graduates have career opportunities in a number of industries and fields including, but not limited to, communications, manufacturing, aerospace, automotive, defense/military, medical, robotics and automation, and consumer electronics. The degree also provides an excellent background for graduate study in Electrical Engineering or Computer Engineering as well as Law and Medicine.

Types of Jobs Accepted

Computer Engineering graduates often gain entry-level positions as embedded hardware designers, software developers, or design engineers with engineering and consulting firms across various industries including aerospace, defense, automotive, and robotics.

Jobs of Experienced Alumni

Alumni of the Department of Electrical and Computer Engineering currently hold positions such as distribution manager, Alabama Power; vice president, ADTRAN; senior design engineer, Radiance Technologies; senior engineer, TSC.

Learn more about opportunities in this field at the Career Center