Computer Engineering

ADDENDUM - 7/26/2024

The mission of the Dr. Muhammad Harunur Rashid Department of Electrical and Computer Engineering is to offer undergraduate and graduate programs of excellence in engineering that serve the needs of the West Florida region, the state, and the nation. The goal of these programs is to prepare students for a successful professional career in their respective chosen discipline of study.

The Bachelor of Science degree in Computer Engineering program at UWF is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org. ABET is the recognized accreditor for college and university programs in applied science, computing, engineering and technology and is among the most respected accreditation organizations in the United States.

The program's educational objectives are to ensure:

- Graduates of the program will be successful in the professional practice of engineering or related fields and will advance in their chosen careers.
- Graduates of the program will be successful in pursuing advanced degrees in engineering or related fields.

The program provides students with a strong theoretical and practical background in computer hardware and software, along with the engineering analysis, design, and implementation skills necessary to work between the two. A computer engineer is someone with the ability to design a complete computer system—from its circuits to its operating system to the algorithms that run on it. Although it is valid to look at software and hardware separately, a computer engineer must take a more holistic approach. If an electronic device can be called a computer, it must produce mathematically meaningful results. Similarly, any useful theory of computing must be physically realizable. The synthesis of theory and algorithms, which must take place before any useful computing can be achieved, is the job of the computer engineer. To produce such engineers is the mission of this program.

Computer engineering deals with the body of knowledge that forms the theoretical and practical basis for the storage, retrieval, processing, analysis, recognition, and display of information. This area also includes the design and implementation of computer systems and peripheral devices for information handling and engineering applications. The computer engineering curriculum provides a balance of hardware, software, and computer theory and applications with a basic background in electrical engineering. Nine credits of electives are included to permit a student to delve deeply into selected subject matter. Computer engineers find career opportunities in a wide variety of companies or organizations involving the design, development, building, testing, and operation of computer systems. Computer engineers deal with both hardware and software (programming) problems. In designing a computer system, computer engineers must decide how much of the computer logic to put into hardware and how much to put into software. The work of computer engineers and computer scientists overlap and the two are often confused. Computer engineers tend to be more involved with the computer hardware, whereas computer scientists tend to be more involved with the computer software, with less emphasis on hardware.

Program Requirements

Students are required to have a laptop or tablet PC. Please visit our department website for information about minimum hardware configuration, department scholarships, and other useful information.

In addition to the University's general requirements, students seeking the B.S. in Computer Engineering must meet the requirements listed below:

A minimum course grade of "C" or better is required in the Computer Engineering core courses and all courses that serve as prerequisites to other required courses in the Computer Engineering program. A grade of "C-" is acceptable in math, science, and Computer Science prerequisite courses. Please see the required courses section for a list of courses that require a minimum grade of a "C" or "C-".

The Computer Engineering curriculum is designed to yield a set of outcomes. Each upper-division course within the curriculum contributes to at least one of these outcomes. A list of our current outcomes and how they map to our program can be found on the Institutional Effectiveness website.

All seniors must complete an exit interview and submit a copy of their senior design report before graduating.

General Education

In addition to the General Education requirements listed on this page, students must satisfy all additional University requirements, including the College-Level Communication and Computation, Multicultural, and Foreign Language requirements. With appropriate planning and coordination with an academic advisor, students may satisfy some of the general University requirements through the General Education curriculum. For a complete listing of general degree requirements, refer to the State University Requirements section of this catalog.

General Education Curriculum:

Communication

ENC 1101	English Composition I (Core)	3
ENC 1102	English Composition II (Breadth)	3

Humanities

Choose one course from Group A (Core) and one additional course from either Group A or Group B (Breadth)		6
Group A (Core)		
ARH 1000	Art Appreciation	
LIT 2000	Introduction to Literature	
MUL 2010	Music Appreciation	
PHI 2010	Introduction to Philosophy	
THE 2000	Theatre Appreciation	
Group B (Breadth)		
AML 2010	American Literature I	
AML 2020	American Literature II	
ARH 2050	Western Survey I: Prehistory to the Medieval Period	
ARH 2051	Western Survey II: Renaissance to Contemporary	
ART 1015C	Exploring Artistic Vision	
ART 2821	The Self, Creativity, Your Career and Visual Culture	
CRW 2001	Introduction to Creative Writing	

ENL 2010	History of English Literature I
ENL 2020	History of English Literature II
IDH 1040	Honors Core: Humanities
LIT 2030	Introduction to Poetry
MUH 2930	The Music Experience: Special Topics
PHI 2103	Critical Thinking
PHI 2603	Ethics in Contemporary Society
REL 1300	World Religions
SPC 2608	Public Speaking
THE 2300	Survey of Dramatic Literature

Mathematics

Choose one course from Group A (Core) and one Additional course from either Group A or Group B (Breadth)	6
Group A (Core)	
MAC 1105	College Algebra
MAC 1105C	College Algebra with Lab
MAC 2311	Analytic Geometry and Calculus I
MGF 1130	Mathematical Thinking
STA 2023	Elements of Statistics
Group B (Breadth)	
MAC 1114	Trigonometry
MAC 1140	Precalculus Algebra
MAC 1147	Precalculus with Trigonometry
MAC 2233	Calculus with Business Applications
MAC 2312	Analytic Geometry and Calculus II
MGF 1131	Mathematics in Context
STA 2360	Introduction to Data Science

Natural Sciences

Choose one course from Group A (Core) and one additional course from either Group A or Group B (Breadth)	6
Group A (Core)	
AST 1002	Descriptive Astronomy
BSC 1005	General Biology for Non-Majors *
BSC 1085	Anatomy and Physiology I *
BSC 2010	Biology I
CHM 1020	Concepts in Chemistry *
CHM 2045	General Chemistry I *
ESC 2000	Introduction to Earth Science *
EVR 2001	Introduction to Environmental Science
GLY 2010	Physical Geology
PHY 1020	Conceptual Physics
PHY 2048	Calculus-Based Physics I *, **
PHY 2048C	Calculus-Based Physics I Studio ***
PHY 2053	Algebra-Based Physics I *, **
Group B (Breadth)	
ANT 2511	Biological Anthropology *
AST 2037	Life in the Universe
BOT 2010	General Botany
BSC 1050	Fundamentals of Ecology
BSC 1086	Anatomy and Physiology II *
BSC 2011	Biology II
BSC 2311	Introduction to Oceanography and Marine Biology *
CGS 2020	Introduction to Machine Learning
CHM 2046	General Chemistry II *
CIS 2530	Introduction to Cybersecurity
IDH 1043	Honors Core: Natural Sciences
MCB 1000	Fundamentals of Microbiology *
PHC 2082	Informatics and Your Health
PHY 2049	Calculus-Based Physics II *, **
PHY 2054	Algebra-Based Physics II *, **

* May be taken with or without lab.

** Algebra-Based Physics is usually recommended for non-science majors, while Calculus-Based Physics is recommended for science majors.

*** Although students receive 5 semester hours credit for PHY 2048C, an additional 3 semester science course will be needed to meet General Education requirements.

Social Sciences

Choose one course from Group A (Core) and one additional course from either Group A or Group B (Breadth)	6
Group A (Core)	
AMH 2010	United States to 1877
AMH 2020	United States Since 1877
ANT 2000	Introduction to Anthropology
ECO 2013	Principles of Economics Macro
POS 2041	American Politics
PSY 2012	General Psychology
Group B (Breadth)	
ANT 2100	Introduction to Archaeology
ANT 2400	Current Cultural Issues
CCJ 2002	Survey of Crime and Justice
COM 2023	Death and Communication
CPO 2002	Comparative Politics
DEP 2004	Human Development Across the Lifespan
EUH 1000	Western Perspectives I
EUH 1001	Western Perspectives II
FIN 2104	Personal Financial Planning
GEA 2000	Nations and Regions of the World
GEB 1011	Introduction to Business
HIS 2050	Explore History: Special Topics
IDH 1041	Honors Core: Social Sciences
INR 2002	International Politics
MMC 2000	Principles of Mass Communication
PLA 2013	Survey of American Law
SOW 2192	Understanding Relationships in the 21st Century
SPM 2010	Sport in Global Society
SYG 2000	Introduction to Sociology
SYG 2010	Current Social Problems

General Education Electives

Choose an additional course from two of the five areas of Communication, Mathematics, Social Sciences, Humanities, and Natural Sciences.

In order to minimize the number of courses required, students should consult with their academic advisor for courses which will satisfy both the General Education requirements and common prerequisites. For example, students can take MAC 2311 Analytic Geometry and Calculus I or MAC 2312 Analytic Geometry and Calculus II to complete the Mathematics requirement. The sciences listed in the Common Prerequisites section will also fulfill the General Education Natural Science requirement. To maximize the overlap, one of the two General Education Electives should be taken in the Natural Sciences, specifically CHM 2045 General Chemistry I , PHY 2048 Calculus-Based Physics I , or PHY 2049 Calculus-Based Physics II.

Multicultural Requirement

Multicultural Courses

An important component of a liberal education is the study of cultures other than one's own. As such, multiculturalism encompasses the appreciation of the values, expressions, and modes of organization of diverse cultural communities. To further such study, the University of West Florida requires all students pursuing a bachelor's degree to complete at least one course that explores one or more of the dimensions of another culture (language, religion, socio-economic structures, etc.). Students are exempt from this requirement if they have completed an A.A. degree, the general education program at a Florida public institution, or a baccalaureate degree.

The requirement is satisfied by the successful completion of a multicultural course designated on the following list. Several of the selections are General Education courses, and students may enroll in these to meet both the General Education and the multicultural requirements.

***Passed by UWF Faculty Senate on 11/08/2002*

This list is continually updated and students are encouraged to check with their advisors for alternative options.

AML 2010	American Literature I	3
AML 2020	American Literature II	3
AML 3604	African American Literature	3
AML 3624	Black Women Writers	3
AML 4015	Topics in Nineteenth-Century American Literature	3
AML 4640	Topics in Native American Literature	3
ANT 1001	Anthropology as a Profession	1
ANT 2000	Introduction to Anthropology	3
ANT 2301	Human Sexuality and Culture	3
ANT 3212	Peoples and Cultures of the World	3
ANT 3312	North American Indians	3
ANT 3363	Japanese Culture	3
ANT 4006	Anthropology of Human Rights	3
ANT 4025	Ritual Use of Human Remains	3
ANT 4403	Environmental Anthropology	3
ANT 4516	Modern Human Physical Variation	3
ARH 1000	Art Appreciation	3
ARH 2050	Western Survey I: Prehistory to the Medieval Period	3
ARH 3201	Art and Culture in The Global Middle Ages	3
ARH 2051	Western Survey II: Renaissance to Contemporary	3
ARH 3590	Non-Western Art	3
ARH 3607	Native American Art	3
ARH 4412	The Age of Revolution to Romanticism in Europe: 1750-1850	3
ARH 4450	Modern Art: 1850-1980	3
ARH 4470	Contemporary Art	3
ARH 4563	Art of Japan	3
CCJ 3678	Race, Gender, Ethnicity, and Crime	3
COM 3014	Gender Communication	3
COM 3461	Intercultural Communication	3
COM 4242	Communication and Christianity	3
CPO 2002	Comparative Politics	3
CRW 2001	Introduction to Creative Writing	3
EDF 2085	Teaching Diverse Populations	3
ENG 4013	Introduction to Literary Theory	3
ENL 2020	History of English Literature II	3
EUH 1000	Western Perspectives I	3
EUH 1001	Western Perspectives II	3
EUH 3334	Emperors, Sultans, Dictators, and Democrats: The Balkans	3
EUH 3411	Rome and the Mediterranean World	3
EUH 3576	Soviet Union since 1917	3
FOL 3501	Global Cinema	3
GEA 2000	Nations and Regions of the World	3
GEB 4361	International Business	3
GEO 3421	Cultural Geography	3
GEO 3471	Geography of World Affairs	3
HSC 2622	Introduction to Global Health Sciences	3
HIS 2050	Explore History: Special Topics	3
HIS 4262	Rise and Fall of the Portuguese Empire	3
IDH 1040	Honors Core: Humanities	3
IDH 1041	Honors Core: Social Sciences	3
INR 2002	International Politics	3
LAH 4135	Spanish Conquest of the Americas	3
LAH 4131	'Atlantic Indians': How Indigenous and African Peoples Shaped Europe & the Americas	3
LAH 4451	Greater Mexico: Central America from Conquest to the 20th Century	3
LAH 4728	Gender and Sexuality in Latin America from Colonization to Today	3
LIT 2000	Introduction to Literature	3
LIT 2030	Introduction to Poetry	3
LIT 4036	Topics in Poetry and Poetics	3
LIT 4385	Feminist Theory	3
MAN 4102	Management of Diversity	3
MAR 4156	Seminar in International Marketing	3
MMC 3743	Communicating Fear: Horror Films and Popular Culture	3
MMC 3745	Communicating Fear Abroad: International Horror Films & Popular Culture	3

MMC 4601	Minorities and the Mass Media	3
MUH 2930	The Music Experience: Special Topics	3
MUL 2010	Music Appreciation	3
NUR 4615	Patient Centered Population Health	3
NUR 4636	Population-based Public Health Nursing	3
PHI 3790	African Philosophy	3
PUR 3404	International Public Relations	3
PSY 3860	Positive Psychology	3
SOP 3730	Psychology, Culture, and Society	3
SOW 4233	Human Diversity and Social Justice	3
SPN 3400	Advanced Stylistics	3
SPN 4520	Latin American Culture and Civilization	3
SYO 4421	Sociology of Health, Illness and Health Care	3
SYO 4530	Inequality in America	3

Civic Literacy Requirement

The 2017 Florida Legislature amended Section 1007.25, Florida Statutes, to require students ***initially entering*** **a State University System (SUS) and/or Florida College System (FCS) institution in 2018-2019** and thereafter to demonstrate competency in civic literacy. The 2021 Legislature further amended Florida Statutes, requiring students to complete both a civic literacy course and an exam. As a result, there are three cohorts of students currently matriculating at Florida public institutions subject to varying requirements. As demonstrated in the table below, the exact civic literacy requirements are based on the academic term in which a student first enrolled in a Florida public institution.

Students Included in Cohort	Civic Literacy Competency Requirement
Cohort 1: Students first entering the SUS or FCS prior to fall 2018	None
Cohort 2: Students first entering the SUS or FCS in fall 2018 – summer A 2021	Complete a course **or** exam (course options AMH 2020, POS 2041)
Cohort 3: Students first entering the SUS or FCS in summer B 2021 (on or after July 1, 2021) and thereafter	Complete both a course **and** exam (course options AMH 2020, POS 2041)

Additionally, the 2021 Legislature made two additional exceptions: approving the use of accelerated mechanisms for meeting the course competency requirement and exempting high school students who pass the Florida Civic Literacy Exam in high school from the postsecondary exam requirement. These two changes are in effect for Cohort 3.

There are multiple ways to satisfy this requirement. Students should work with their academic advisor to determine which option is best for their degree requirements/degree plan.

Additional information can be found on our Civic Literacy website, SUS regulation BOG 8.006 and Florida Statute s.1007.25(4,a-b).

Mathematics Pathway

Students are advised to complete the following courses to fulfill the mathematics pathway that aligns with the mathematics skills needed for success in their program and their career goals. Students should refer to their academic advisor for questions about the math pathway for their program. For information about this requirement, refer to the catalog page for Mathematics Pathways. These courses may also fulfill requirements for General Education and Common Prerequisites.

Algebra through Calculus

Students will be placed on a starting point based on their mathematics placement.		
MAC 1105	College Algebra	3
or MAC 1105C	College Algebra with Lab	
or MAC 1140	Precalculus Algebra	
or MAC 1114	Trigonometry	
or MAC 1147	Precalculus with Trigonometry	
or MAC 2311	Analytic Geometry and Calculus I	
MAC 1140	Precalculus Algebra	3
or MAC 1114	Trigonometry	
or MAC 1147	Precalculus with Trigonometry	
or MAC 2311	Analytic Geometry and Calculus I	
or MAC 2312	Analytic Geometry and Calculus II	

Common Prerequisites

State-mandated common prerequisites must be completed prior to graduation, but are not required for admission to the program. See the Common Prerequisite Manual for course substitutions from Florida colleges and universities.

The following courses and labs require a minimum grade of "C-".

CHM 2045+L	General Chemistry I (+Lab) *	4
MAC 2311	Analytic Geometry and Calculus I *	4
MAC 2312	Analytic Geometry and Calculus II *	4
MAC 2313	Analytic Geometry and Calculus III	4
MAP 2302	Differential Equations	3
PHY 2048+L	Calculus-Based Physics I (+Lab) *	4
PHY 2049+L	Calculus-Based Physics II (+Lab) *	4
Total Hours		**27**

* Indicates common prerequisites which can be used to satisfy General Education requirements.

Note that all of the math and science common prerequisites do not have to be taken before students begin taking the major courses below. However, students do have to complete the specific math and science courses (with a minimum grade of a "C-") that are listed as prerequisites for any engineering course they would like to take.

Major

COP 3014	Algorithm and Program Design +, c-	3
COP 3530	Data Structures and Algorithms I +, c-	3
COP 4534	Data Structures and Algorithms II +, c-	3
COP 4634	Systems & Networks I +, c-	3
COP 4635	Systems & Networks II +	3
COT 3100	Discrete Structures +, c-	3
EEE 3308+L	Electronic Circuits I (+Lab) +, c	4
EEL 3111+L	Circuits I (+Lab) +, c	4
EEL 3112	Circuits II +, c	3
EEL 3135	Discrete-Time Signals and Systems +, c	3

EEL 3701+L	Digital Logic and Computer Systems (+Lab) +, c	4
EEL 4712+L	Digital Design (+Lab) +, c	4
EEL 4713	Digital Computer Architecture +	3
EEL 4744+L	Microprocessor Applications (+Lab) +, c	4
EGM 4313	Intermediate Engineering Analysis +, c	3
EGN 3204	Engineering Software Tools +, c	1
EGS 4032	Professional Ethics +	3
EGN 4950	Capstone Design I 2, +, c	1
EGN 4952L	Capstone Design II 2, +, c	2
Advisor approved EEL/EEE electives 1, +		12
Choose one of the following +		3
EEE 3396	Solid-State Electronic Devices	
or EEE 4311	VLSI Circuit Design	
Total Hours		**72**

1 EEL/EEE Elective restrictions: These electives must begin with the EEL or EEE prefix and cannot be otherwise required for the program. A limited set of preapproved Mechanical Engineering courses may also be used. See your advisor for details. A maximum of 3 semester hours (sh) in EEL 4949 Co-Op Work Experience, 3 sh in EEL 4905, and 3 sh of EEL 4940 Engineering Internship will be accepted as EEL/EEE elective credits. In addition, combined experiential learning credits (EEL 4940 Engineering Internship and EEL 4949 Co-Op Work Experience) are limited to a maximum of 3 sh toward electives. Consult the department for the current list of approved EEL/EEE Elective courses. The department feels that licensure is an important step in an Engineer's career. To encourage our students to pursue their professional license, our students may take an FE review course toward their electives (3 sh maximum).

2 Note that EGN 4950 Capstone Design I and EGN 4952L Capstone Design II is the senior design project. This final project is the culmination of the engineering education. As such, this sequence of courses must be taken in the last 2 semesters of a student's program. Seniors must see an academic advisor in order to register for them. Note that even though they aren't prerequisites, we highly recommend that our students complete both EEL 4744 Microprocessor Applications and EEE 3308 Electronic Circuits I prior to taking EGN 4952L Capstone Design II.

Major-Related

EGS 3441	Engineering Statistics 5,c-	3
Advisor-approved Engineering or Computer Science Elective 3, +		3
EGS 1006	Introduction to Engineering 4	1
Total Hours		**7**

3 It is recommended that students who have no programming experience take EEL 4834 Programming for Engineers or a lower division programming course prior to taking COP 3014 Algorithm and Program Design to fulfill this requirement. Please see your advisor for an updated list of acceptable courses to fulfill this elective. If a course is being used as an EEE/EEL elective, it cannot also be used here.

4 Transfer students or non-freshmen may choose to substitute a professional development elective. Work with your academic advisor to choose an elective that will aid you in your career objectives. Typical courses for this elective include, but are not limited to, professional writing courses, courses from STEM departments (not already required for our program), FE review or courses geared toward obtaining certifications, and additional EEL/EEE/EML/EGM elective credits beyond those specifically listed above.

5 Other calculus-based statistics courses may also be acceptable. Please see your advisor.

c Minimum grade of "C" is required in these courses. Note: "C-" is not acceptable. Other courses may also require a "C" if they are prerequisites to electives that you choose.

c- Minimum grade of "C-" is required in these courses.

\+ Courses included in the major GPA.

Computer Engineering Minor

A Computer Engineering minor provides an opportunity for students majoring in other areas to take a limited number of computer engineering courses to complement their majors. The minor in computer engineering is open to all UWF students with the exception of computer and electrical engineering majors. Students applying for the minor must have a declared major.

Students may not take a course and its prerequisite during the same semester.

Students must complete MAC 2311 with a grade of "C-" or better and the programming course with a minimum grade of "C".

Students seeking the minor in Computer Engineering must have a minimum course grade of "C" or better in the required engineering courses.

Prerequisites

MAC 2311	Analytic Geometry and Calculus I	4
Choose one of the following:		
COP 3014	Algorithm and Program Design	3
or EEL 4834	Programming for Engineers	

Requirements

EEL 3701+L	Digital Logic and Computer Systems (+Lab)	4
EEL 4744+L	Microprocessor Applications (+Lab)	4
EEL 4712+L	Digital Design (+Lab)	4
EEL 4713	Digital Computer Architecture	3
Total Hours		**15**