



FACULTY OF ENGINEERING



DEPARTMENT OF COMPUTER ENGINEERING

Bachelor of Science (BS) Degree – 109 Credits

Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
1	CSIS 200	Introduction to Computers and Programming	3		CSIS 285
1	CSIS 285	Basic Programming Lab	1		
1	ELCP 211	Engineering Drawing	1		
1	ELEN 201	Instrumentation Lab	1		
1	ENGL 203	English Communication Skills III	3		
1	MATH 200	Calculus I	3		
1	MATH 211	Linear Algebra I	3		
1		Engineering Breadth Elective	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
2	CPEN 211	Introduction to Digital Logic Design	3	CSIS 200 Or CSIS 206	
2	CSIS 215	Object-Oriented Programming	3	CSIS 200	CSIS 286
2	CSIS 286	Object Oriented Programming Lab	1	CSIS 200	CSIS 215
2	ELCP 290	Introduction to the Engineering Design Fundamentals	1		
2	ELEN 202	Electrical Simulation and Design	1	CSIS 200 Or CSIS 206	ELEN 221
2	ELEN 221	Circuits Analysis I	3	MATH 200 MATH 211 ELEN 201	ELEN 202
2	MATH 202	Calculus II	3	MATH 200	
2	MATH 270	Differential Equations	3	MATH 200	
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
3	CPEN 202	Logic Lab	1		CPEN 212
3	CPEN 212	Logic Circuits	3	CPEN 211	CPEN 202
3	CPEN 220	Programming for Engineering Solutions	3	CSIS 200	MATH 230
3	GENG 221	Engineering Ethics	3	ELCP 290 ENGL 203	

3	ELEN 231	Electronics I	3	ELEN 221	
3	ENGL 2XX	English Elective	3	ENGL 203	
3	MATH 230	Numerical Analysis I	3	CSIS 200 MATH 200	
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
4	CPEN 213	Microprocessors	3	CPEN 212	
4	ELEN 222	Signals and Systems Theory	3	ELEN 221 MATH 270	
4	CPEN 313	Computer Embedded System	3	CPEN 212	CPEN309
4	GENG 222	Sustainable Development for Engineers	3	ELCP 290 ENGL 203	
4	ELEN 303	Circuits Analysis Lab	1	ELEN 221 ELEN 202	
4	ELEN 304	Electronics Lab	1	ELEN 231	
4	LISP 200	Information Skills and Search Techniques	1		ENGL 102
4	CPEN 309	Embedded Controllers Lab	1		CPEN 313
4	MATH 246	Probability for Engineers	3	MATH 200	
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
5	CPEN 305	Microcontrollers Lab	1	CPEN 213	
5	CPEN 307	PLC Lab	1		CPEN 324
5	CPEN 314	Computer Architecture	3	CPEN 313	
5	CPEN 324	Programmable Logic Controllers	3		CPEN 307
5	CPEN 241	Information Networking I	3		
5	ELCP 391	Senior Design 1	2	LISP 200 ELCP 290 GENG 221 GENG 222	
5	ELEN 341	Telecommunications	3	MATH 246 ELEN 222	
		Specialized Area Elective	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
6	CPEN 310	Cybersecurity Lab	1		
6	CPEN 341	Cybersecurity	3		
6	CSPR XXX	Cultural Studies	3		
6	ELCP 392	Senior Design 2	2	ELCP 391	

6	ELEN 306	Telecommunications Lab	1	ELEN 341	
6	ELEN 326	Digital Signal Processing	3	ELEN 222	
6		Specialized Area Elective	3		
		TOTAL	109		
Specialized Area Elective (based on selected area):					
Telecommunications and Networking Track (6 credits from the following list):					
	ELEN 223	Electricity and Electromagnetism	3	MATH 202 MATH 270 ELEN 221	
	ELEN 340	Signal Transmission	3	ELEN 223	
Cyber Systems Track (6 credits from the following list):					
	CPEN 347	Teletraffic	3	CSIS 222	
	CSIS 216	Data Structure	3	CSIS 215	
	CSIS 221	Operating Systems	3	CSIS 215	
	CSIS 270	Databases	3	CSIS 200	
Artificial Intelligence and Machine Learning Track (6 credits from the following list):					
	CPEN 349	Artificial Intelligence for Engineers	3	CSIS 200 or CSIS 206	
	CSIS 221	Operating Systems	3	CSIS 215	
	CSIS 216	Data Structure	3	CSIS 215	
	CSIS 235	Mobile Programming	3	CSIS 215	
	CSIS 260	Introduction to Artificial Intelligence	3	CSIS 216	
	CSIS 270	Databases	3	CSIS 200	
Engineering Breadth Elective (3 credits from the following list):					
	MECH 221	Engineering Dynamics	3	CIVE 201	
	MECH 232	Thermodynamics	3		
	CIVE 201	Statics	3		

COURSE DESCRIPTIONS

CPEN 202 LOGIC LAB

0.3: 1 cr. E

This laboratory provides hands-on experiments on digital circuits, supplementing the concepts presented in the digital course. The lab covers both combinational and sequential logic. Students are exposed to the conventional discrete gates as well as the highly integrated programmable logic devices such as FPGAs. Students implement and simulate their designs using computer aided design tools.

Co-requisite: CPEN 212

CPEN 211 INTRODUCTION TO DIGITAL LOGIC DESIGN

3.0: 3 cr. E

This course is the first of a two-course series on digital design. It covers both combinational and sequential logic, equipping the students with the skills to design and analyze complex digital circuits. It covers a wide range of topics, including Boolean algebra, Karnaugh maps (K-maps), multiplexers, adders, decoders, flip-flops, registers, counters, and more. Through a combination of theoretical concepts and hands-on practical exercises, students will develop the skills necessary to design and analyze digital circuits and systems effectively.

Pre-requisites: CSIS 200 or CSIS 206

CPEN 212 LOGIC CIRCUITS

3.0: 3 cr. E

This course is the second in a two-course series on digital design. The focus of this course is on designing combinational and sequential circuits. Design examples include Timing analysis, Registers, Register File, State-Machines, Arithmetic units etc... Several real-world applications will be discussed. Computer aided design tools and educational platforms such as FPGAs will be used throughout semester.

Pre-requisite: CPEN 211

Co-requisite: CPEN 202

CPEN 213 MICROPROCESSORS

3.0: 3 cr. E

This course covers the concept of microcontrollers and their applications through an in-depth exposure to the Microchip PIC18F45K22 processor. The class emphasizes the following concepts: efficient software design techniques in Assembly and C languages, input/output ports, I/O devices (keypad, LCD, 7-segment displays, etc.), interrupts, timers, A/D and D/A conversion, asynchronous serial communications.

Pre-requisite: CPEN 212

CPEN 220 PROGRAMMING FOR ENGINEERING SOLUTIONS

3.0: 3 cr. E

This course will teach students the skills to write assembly and C code to solve engineering problems. It will start with the basics of assembly language and gradually progress to advanced topics in C. By the end of the course, students will be able to write efficient and robust code that can be used to solve a wide range of engineering problems.

Co-requisite: MATH230

Pre-requisite: CSIS 200 or CSIS 206

CPEN 241 INFORMATION NETWORKING I

3.0: 3 cr. E

This course covers: Networks and Open Systems Intercommunication (OSI) reference model. Standards organizations. Functionality, principal entities of protocol in physical link, network, transport, and session of applications layer.

CPEN 305 MICROCONTROLLERS LAB**0.3: 1 cr. E**

This lab aims at applying the various concepts taught in CPEN 213 (Microprocessors). The primary goal is to teach students how to design and implement working prototypes of various applications of the PIC18 microcontrollers such as: digital voltmeter, digital thermometer, programmable timer, LM12864L Graphics LCD, 4-Wire Resistive Touch-Screen Panel, Serial Communications and the UART, etc.

Pre-requisite: CPEN 213

CPEN 307 PLC LAB**0.3: 1 cr. E**

The ability of describing the communication links involved with PLC systems, the protocols, and networking methods. This Lab will permit the student to develop ladder programs involving internal relays, timers, counters, shift registers, sequencers, and data handling, safety issues with PLC systems, testing, and debugging.

Co-requisite: CPEN 324

CPEN 309 EMBEDDED CONTROLLERS LAB**0.3: 1 cr. E**

The lab complements the Embedded Systems course and gives students hands-on experience on the materials presented in the course. The set of experiments devised for the lab are based on Intel FPGA with NIOS II embedded processor. Experiments involve both hardware and software, leading to a complete system on a chip (SoC). Software will be developed in C/C++ for the NIOS embedded processor, whereas the hardware will be described using System Verilog HDL.

Co-requisite: CPEN 313

CPEN 310 CYBERSECURITY LAB**0.3: 1 cr. E**

The lab provides a hands-on learning experience in a safe environment covering current topics on the cybersecurity basics and applications of infrastructure security, network security, security devices, local network security, and access control monitoring systems.

CPEN 313 COMPUTER EMBEDDED SYSTEMS**3.0: 3 cr. E**

This course provides an introduction to embedded computing systems and their interface to memory and peripherals. The course is based on FPGA technology, where hardware interfaces with software leading to a complete system on a chip (SoC). Software will be developed mainly in C/C++ for the embedded processor, whereas the hardware will be described using System Verilog HDL.

Pre-requisite: CPEN 212

CPEN 314 COMPUTER ARCHITECTURE**3.0: 3 cr. E**

This course is an introduction to the organization and design of computer systems, assembly language programming, and the hardware/software interface. The central ideas of computer organization and design are covered with emphasis on processor architecture implementation, the relationship between hardware and software, and the basic design trade-offs employed in contemporary computer systems. Topics covered include performance evaluation, RISC-based instruction set architecture, single cycle, multi-cycle, and pipelined processor design, and memory hierarchy: cache and virtual memory.

Pre-requisite: CPEN 313

CPEN 324 PROGRAMMABLE LOGIC CONTROLLERS**3.0: 3 cr. E**

The student will be able to identify and explain the main design characteristics, internal architecture, and operating principles of programmable logic controllers. Also, the student will be capable of identifying

the characteristics of commonly used input and output devices. The ability of describing the communication links involved with PLC systems, the protocols, and networking methods. This course will permit the student to develop ladder programs involving internal relays, timers, counters, shift registers, sequencers, and data handling, safety issues with PLC systems, testing, and debugging.

Co-requisite: CPEN 307

CPEN 341 CYBERSECURITY

3.0: 3 cr. E

This course introduces learners to the interdisciplinary field of cybersecurity by discussing the evolution of information security into cybersecurity. Learners will be exposed to multiple cybersecurity technologies, processes, and procedures, learn how to analyze the threats, vulnerabilities and risks present in these environments, and develop appropriate strategies to mitigate potential cybersecurity problems.

CPEN 347 TELETRAFFIC

3.0: 3 cr. E

This course exposes students to theoretical and practical aspects of modern communication network design, including Teletraffic engineering and network performance modeling. It covers an overview of relevant stochastic traffic modeling, traffic characterization, traffic measurement techniques, network dimensioning principles, queuing theory and its application to performance evaluation of networks. Students analyze practical examples of network dimensioning for capacity and network performance evaluation using simulation software packages.

Pre-requisite: CSIS 222

CPEN 349 ARTIFICIAL INTELLIGENCE FOR ENGINEERS

3.0: 3 cr. E

This course introduces Artificial Intelligence (AI) to engineering students, both the basic topics and state-of-art algorithms. The course will look into a variety of AI subareas such as problem solving, reasoning and machine learning. Modern tools will be used to implement and evaluate different AI techniques and synthesize solutions to real-world engineering problems.

Pre-requisite: CSIS 200 or CSIS 206

FACULTY OF ENGINEERING GENERAL COURSES

GENG 221 ENGINEERING ETHICS

3.0: 3 cr. E

This course introduces and reinforces the concepts, theories, and practice of engineering ethics and aims at providing basic knowledge of ethics for engineers in different types of work roles. It prepares the engineering students for identifying, taking responsibility for, and finding solutions to potential ethical problems/cases. It provides students with an interactive study of ethical theory and the development of professionalism and helps them think more clearly and deeply about ethical issues of the natures that engineers often face in professional practice, and explore resources, strategies, and options for dealing with such complications. Students review case studies of ethical conflicts in engineering practice. The course also covers engineering codes of ethics and requires students to resolve theoretical situations through the application of ethical codes.

(A core BS course as of 2023/24 to replace a CSPR XXX course for students who started from year 2022/2023. Previous students can take it as an equivalent of a CSPR XXX course if they have not already taken the required 3 CSPR XXX courses)

Pre-requisite: CHEN/CIVE/ELCP/MECH/290 (according to discipline), ENGL 203

GENG 222 SUSTAINABLE DEVELOPMENT FOR ENGINEERS

3.0: 3 cr. E

This course introduces the fundamental and advanced concepts of sustainable development. It transitions students' understanding of the UN Sustainable Development Goals (SDGs) to focus specifically on the critical role of engineers in achieving these SDGs. Students should then be able to resolve problems by adopting sustainability principles, which should in turn reflect on the students' multidisciplinary design ability to ensure a proper sustainable design process to improve and preserve the quality of life for future generations.

(A core BS course as of 2023/24 to replace a CSPR XXX course for students who started from year 2022/2023. Previous students can take it as an equivalent of a CSPR XXX course if they have not already taken the required 3 CSPR XXX courses)

Pre-requisite: CHEN/CIVE/ELCP/MECH/290 (according to discipline), ENGL 203

GENG 311 ENGINEERING MANAGEMENT AND ECONOMICS

3.0: 3 cr. E

Engineers with excellent managerial skills and superior economic acumen are needed as leader of the new century engineering world. This course prepares engineers to fulfill their managerial responsibilities and acquire useful economic perspectives. This course is organized to contain two major parts: (I) Functions of engineering management, and (II) Economic fundamentals for engineering managers. Part (I) introduces the basic functions on engineering management such as planning, organizing, leading and controlling, while part (II) covers the fundamentals of engineering economics.

Refer to General Listing of Course Descriptions for:

CSIS XXX

Refer to the Faculty of Arts and Sciences

CSPR XXX

Refer to the Faculty of Arts and Sciences

ELEN XXX

Refer to the Department of Electrical Engineering

ENGL XXX

Refer to the Faculty of Arts and Sciences

ENMG XXX

Refer to the Faculty of Engineering

GENG XXX

Refer to the Faculty of Engineering

LISP XXX

Refer to the Faculty of Arts and Sciences

MATH XXX

Refer to the Faculty of Arts and Sciences

MECH XXX

Refer to the Department of Mechanical Engineering