

(EXISTING)

Name of Program: **Computer Engineering**

- **Telecommunications**
- **Data and Computer Networking**

(BACHELOR OF SCIENCE)

Degree: **Bachelor of Science**

The Computer Engineering Program provides students with the software, hardware and electronics engineering skills required to design, deliver and maintain efficient and effective computing systems. The program develops practical skills through extensive project work, covering computing, electronics, and embedded systems, as well as a firm foundation in the principles and theory of Computer Engineering.

GENERAL OBJECTIVES:

- to develop the student's capacity to think, write and speak effectively and creatively
- to develop an appreciation of and respect for social, moral, and ethical values as the foundation of one's relationship to others and one's responsibilities to the community;
- to develop the student's analytical, decision-making and communication competencies together with those qualities of self reliance, responsibility, integrity and self-awareness which will promote personal achievement and contribution to organizations;
- to build breadth of perspective through the general education requirements and provide sufficient specialization to meet basic professional and career requirements;
- to provide the student with the necessary requirements for academic and/or career advancement.

SPECIFIC OBJECTIVES:

- To prepare students for a lifetime career in Computing by establishing a foundation for lifelong learning and development;
- To provide students with a foundation in Computers in general and Computer Engineering in particular;
- To prepare students for careers in industry, government and various institutions;
- To enable students to respond positively and effectively to the role that the Computer Engineer fulfills in the design, installation and maintenance of computer systems;
- To center attention on the skills and knowledge required by the profession of Computer Engineering and to help students acquire knowledge and develop skills in a systematic way;
- To assist the students in developing leadership abilities, which can be used in reaching solutions to problems in computer engineering.

LEARNING OUTCOMES:

On successful completion of this program it is expected that students will:

1. have detailed knowledge and understanding of essential facts, concepts, principles, and theories relating to Computer Engineering and software and hardware applications.
2. be able to use such knowledge for the design, construction, implementation, and maintenance of software and hardware components of modern computing systems and computer-controlled equipment.
3. appreciate the importance of practicing as professionals, and having the breadth and depth of knowledge expected of a practicing engineer.

4. be able to use oral and writing skills in a variety of contexts - both inside and outside of computer engineering courses.
5. have a good understanding of the important relationship between theory and practice through their exposure to the laboratory part of the course.
6. appreciate the importance of understanding the relevant professional, ethical, and legal issues related to the work of a Computer Engineer.
7. appreciate the importance of team activity and the strengths that can be derived from this.
8. be able to address a significant problem in computer engineering, and demonstrate the ability to deploy an appropriate selection of tools and techniques, as well as a disciplined approach, in arriving at a solution of the problem. This will be achieved through the project work of the course.

Students following the Concentration in Data and Computer Networking are expected to further be able to:

1. Describe the services and devices that support data communications and the Internet.
2. Build, configure and troubleshoot modern LAN and WAN networks using routers and switches.
3. Explain and apply addressing schemes, naming schemes, subnet mask usage in the IPv4 and IPv6 environments.
4. Define, configure, monitor and troubleshoot network traffic and operation.
5. Identify and design the required network solutions for specific environments.
6. Describe wireless technologies; analyze wireless network topologies; compare and evaluate different wireless communication protocols.
7. Define, configure and troubleshoot enhanced switching technologies and wireless routers and clients.

Students following the Concentration in Telecommunications are expected to further be able to:

1. Recall, classify and analyse wireless systems.
2. Apply time and frequency domain analysis and the different transform techniques.
3. Define the basic signal transforms and their use in signal processing
4. Design digital filters and describe real life applications of Digital Signal Processing.
5. Define the theory and practice of plane radio, microwave and optical waves in free space.
6. Evaluate wave propagation in different media.
7. Explain the behaviour of a wide variety of practical microwave and optical transmission systems (both mathematically and physically)

EMPLOYMENT POSSIBILITIES:

Systems Engineer, Network Design Engineer, Hardware Support, Hardware Service Engineer.

DEGREE REQUIREMENTS	Credits	ECTS
All students pursuing the Bachelor of Science degree in "Computer Engineering" must complete the following requirements:		
General Education Requirements	18	31
Science Requirements	8	15
Mathematics Requirements	17	31
Major Requirements	77	153

Free Electives	6	10
Total Requirements	126	240

GENERAL EDUCATION REQUIREMENTS		18 credits	31 ECTS
COM 101	Public Speaking	3	5
ENG 103	Instruction in Expository Writing	3	6
CSC 135	Writing for Computer Science & Engineering	3	4
PSY 103	Introduction to Psychology	3	6
General Education Electives		6	10
SCIENCE REQUIREMENTS		8 credits	15 ECTS
PHY 101	Introductory Physics I	3	5
PHY 102	Introductory Physics II	3	4
PHY 161	Introductory Physics I Laboratory	1	3
PHY 162	Introductory Physics II Laboratory	1	3

MATHEMATICS REQUIREMENTS		17 credits	31 ECTS
MAT 101	Calculus I	4	7
MAT 102	Calculus II	4	7
MAT 202	Differential Equations	3	6
MAT 206	Linear Algebra	3	5
MAT 217	Probability & Statistics	3	6
MAJOR REQUIREMENTS		77 credits	153 ECTS
CSC 120	Discrete Structures	3	6
CSC 131	Programming Principles I	3	6
CSC 132	Programming Principles II	3	6
CSC 134	Computer Applications for Engineers	3	6
CSC 205	Data Structures & Algorithms	3	6
CSC 213	Digital Logic	3	5
CSC 214	Computer Organization & Architecture	3	6
CSC 305	Assembly Language	3	5
CSC 322	Data Communications and Computer Networks	3	6

CSC 327	Operating Systems	3	6
ECE 101	Electric Circuits I	3	5
ECE 141	Electric Circuits I Laboratory	1	3
ECE 202	Electric Circuits II	3	5
ECE 211	Electronics I	3	5
ECE 212	Electronics II	3	5
ECE 242	Electric Circuits II Laboratory	1	3
ECE 271	Electronics I Laboratory	1	3
ECE 272	Electronics II Laboratory	1	3
ECE 273	Digital Logic Design Laboratory	1	3
ECE 347	Operating Systems Laboratory	1	3
ECE 338	Microprocessors and Microcomputers	3	5
ECE 389	Microprocessors and Microcomputers Laboratory	1	3
ECE 414	Advanced Computer Organization and Architecture	3	5
ECE 416	Computer Engineering Design	3	6
ECE 482	Data Communications and Computer Networks Laboratory	1	3
ECE 491	Senior Design Project	3	10
Major Electives (Students select five (5) of the following courses) * Students are required to take at least three (3) ECE courses as Computer Engineering Major Electives from the list of Major Electives		15	25
CSC 133	Web Technologies	3	5
CSC 209	Web Programming	3	6
CSC 230	Systems Analysis and Design	3	5
CSC 231	Visual Programming	3	6
CSC 233	Search Engine Optimisation and Internet Marketing	3	6
CSC 324	Compiler Design	3	5
CSC 326	Programming in Unix-like Environment	3	6
CSC 328	Computer Graphics I	3	5
CSC 330	Fundamentals of Distributed Systems	3	6

CSC 331	Database Management Systems	3	6
CSC 340	Artificial Intelligence	3	5
CSC 341	Human Computer Interaction	3	5
CSC 342	The Java Programming Language ¹	3	6
CSC 391	Digital Game Design	3	6
CSC 392	Smartphone Programming	3	6
CSC 401	Theory of Computation	3	6
CSC 403	Graph Theory	3	6
CSC 404	Wireless and Mobile Networks	3	5
CSC 428	Digital Image Processing and Computer Vision	3	6
CSC 440	Network Security	3	6
CSC 450	Contemporary Topics	3	6
CSC 460	Cybercrime Concepts and Legal Considerations	3	6
CSW 231	User Interface Development	3	5
CSW 341	E-commerce and the Internet	3	6
ECE 350	Signals and Systems Theory	3	6
ECE 351	Electric and Magnetic Fields	3	6
ECE 361	Network Fundamentals	3	6
ECE 362	Routing Protocols and Concepts	3	6
ECE 364	Scaling Networks	3	6
ECE 365	Connecting Networks	3	6
ECE 415	Embedded Systems	3	6
ECE 418	Internship Project	3	6
ECE 431	Digital Signal Processing	3	5
ECE 432	Parallel Computing	3	5
ECE 450	Contemporary Topics	3	6
ECE 452	Microwave and Optical Transmission	3	6
ECE 461	Introduction to Robotics	3	5
ECE 462	VLSI Design	3	5
ECE 463	FPGA Design Using VHDL	3	5
MAT 203	Multivariable Calculus	3	6

MAT 205	Introduction to Cryptography	3	6
MAT 208	Discrete Time Systems	3	6
FREE ELECTIVES		6	10

¹ Can only be taken by students with registration number after F2013