Eastern Mediterranean University
Faculty of Engineering

To those who seek the best knowledge
To those who desire better future
To the new generation

Computer Engineering Department

http://cmpe.emu.edu.tr

Undergraduate Catalogue
2011 - 2012
GENERAL INFORMATION

The Department of Computer Engineering was established in 1993. The first group of thirty students graduated in 1997. The M.Sc. and Ph.D. programs were established in 1996. The department moved to its current building in 1998. Currently there are 420 undergraduate students and 102 graduate students. As of October 2011, the total number of students who graduated from the department reaches 1570.

The department has undergraduate and graduate programs of study leading to the degrees of Bachelor of Science (B.Sc.), Master of Science (M.Sc.), and Doctor of Philosophy (Ph.D.) in Computer Engineering.

The department offers a balanced undergraduate program which covers computer software, computer hardware, and computer networks with a strong background on mathematics. The emphasis is mainly on the engineering aspects, analysis and design of hardware and software systems. In addition to Calculus, Physics, English, Economics, and Industrial Management courses, students may take non-technical electives.

The fourth year program has five area elective courses, in addition to a two-term graduation project, developing independent research, report writing and oral presentation skills. All the departmental courses are supplemented by laboratory works and tutorial hours. This approach provides graduates of the program with a breadth of experience, and with the impetus to continue their development throughout their careers.

The department has nine PC laboratories, all with Internet connections via satellite directly to the USA. There are more than 350 PC’s in these laboratories. The logic design laboratories and the microprocessors laboratory are equipped with the latest hardware and software for component based design and for integrated circuit based design. A study room provides the students a quiet and friendly environment for studying in the department.

The department is involved in a number of national and international research projects, in collaboration with various universities and organizations. Currently, research in the following areas is being pursued: ATM Networks, VLSI Routing, Multimedia, Graphical User Interfaces, Expert Systems, Neural Networks, Distance Education, Fuzzy Logic and Parallel Processing. Faculty members are also carrying out some projects within Gazimağusa Technology Development Region.

THE MISSION OF THE COMPUTER ENGINEERING PROGRAM

The mission of the EMU Computer Engineering Program is to educate its students to become multilingual, highly qualified computer engineers who can effectively manage current and future challenges for the benefit of society.

PROGRAM EDUCATIONAL OBJECTIVES OF COMPUTER ENGINEERING DEPARTMENT

1. Practice computer engineering in various industrial/technological sectors at both national and international levels.

2. Communicate their ideas effectively within a bilingual environment, and perform efficient teamwork both in supportive and leadership roles.

3. Be conscious of the necessity for high ethical standards in their profession.

4. Appreciate the need to engage in life-long learning activities, starting with the pursuit of graduate studies.
PROGRAM OUTCOMES OF COMPUTER ENGINEERING DEPARTMENT

Graduates of the Computer Engineering program should attain:

a. An ability to apply knowledge of mathematics, science, and engineering,

b. An ability to design and conduct experiments, as well as to analyze and interpret data,

c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability,

d. An ability to function on multidisciplinary teams,

e. An ability to identify, formulate, and solve engineering problems,

f. An understanding of professional and ethical responsibility,

g. An ability to communicate effectively,

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context,

i. A recognition of the need for, and an ability to engage in life-long learning,

j. A knowledge of contemporary issues,

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice,

l. A knowledge of probability and statistics, mathematics through differential and integral calculus, discrete mathematics, basic sciences, computer science, and engineering sciences necessary to analyze and design software, and systems containing hardware and software components,

m. An ability of multilingual communication.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>July 13, 2011</td>
<td>Online course registration commences (registered students)</td>
</tr>
<tr>
<td>September 7, 2011</td>
<td>Last day for changing 'incomplete' grades</td>
</tr>
<tr>
<td>September 13, 2011</td>
<td>English proficiency test 1st stage; last day for online registration</td>
</tr>
<tr>
<td>September 14, 2011</td>
<td>English proficiency test 2nd stage</td>
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<tr>
<td>September 14-16, 2011</td>
<td>Course registration period (with supervisor)</td>
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<tr>
<td>September 19, 2011</td>
<td>Classes commence</td>
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<tr>
<td>September 26, 2011</td>
<td>Academic year opening ceremony (no classes between 9.30 - 12.20)</td>
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<tr>
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<td>September 26, 2011</td>
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<td>September 26, 2011</td>
<td>Last day for submission of graduation make - up exam grades to the registrar</td>
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<tr>
<td>October 3, 2011</td>
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<tr>
<td>October 29, 2011</td>
<td>TR Republic Day (National holiday)</td>
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<tr>
<td>November 6-9, 2011</td>
<td>Religious holiday (EID AL-ADHA)</td>
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<td>November 11-23, 2011</td>
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<td>January 25, 2012</td>
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<td>January 27, 2012</td>
<td>Last day for submission of the graduation decisions to the registrar</td>
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<td>Graduation ceremony for fall graduates</td>
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<td>Last day for submission of graduation make - up exam grades to the registrar</td>
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<td>Last day for add / drop</td>
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<td>Mid-term exams period</td>
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<td>April 23, 2012</td>
<td>National sovereignty &amp; Children's Day</td>
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<td>May 1, 2012</td>
<td>Last day for applying to get leave of absence</td>
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<td>May 19, 2012</td>
<td>Atatürk commemoration, youth and sports day</td>
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<td>LAST DAY OF CLASSES</td>
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<td>LAST DAY FOR THE SUBMISSION OF GRADES TO THE REGISTRAR</td>
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<td>LAST DAY FOR SUBMISSION OF THE GRADUATION DECISIONS TO THE REGISTRAR</td>
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<td>GRADUATION CEREMONY FOR SPRING GRADUATES</td>
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<td>ON LINE COURSE REGISTRATION COMMENCES</td>
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<tr>
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<td>COURSE REGISTRATION PERIOD (WITH SUPERVISOR )</td>
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<tr>
<td>June 22, 2012</td>
<td>LAST DAY FOR LATE REGISTRATION</td>
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<tr>
<td>June 28, 2012</td>
<td>LAST DAY FOR ADD / DROP</td>
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<td>July 06, 2012</td>
<td>LAST DAY FOR ENTERING COURSES TO BE OFFERED IN FALL SEMESTER</td>
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<td>July 20, 2012</td>
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<tr>
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<td>RELIGIOUS HOLIDAY (EID AL-FITIR)</td>
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<td>August 30, 2012</td>
<td>VICTORY DAY (TURKEY)</td>
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<td>August 31, 2012</td>
<td>DIPLOMA AWARDING TO SUMMER SCHOOL GRADUATES</td>
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**Summer School**

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<td>DIPLOMA AWARDING TO SUMMER SCHOOL GRADUATES</td>
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</table>
FACULTY

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Administrative Officer
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Operator
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UNDERGRADUATE PROGRAM AND FACILITIES

I. UNDERGRADUATE CURRICULUM

First Year

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<th># of crs.</th>
<th>R.Code</th>
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Sub-Total: 17 27

First Year: Spring Semester (Second Semester)

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Sem. Total: 17 28
Sub-Total: 34 55

Second Year

Second Year: Fall Semester (Third Semester)

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Sem. Total: 19 31
Sub-Total: 53 86

Second Year: Spring Semester (Fourth Semester)

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Sem. Total: 18 31
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### Third Year

#### Third Year: Fall Semester (Fifth Semester)

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Sem. Total: 19 31  
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#### Third Year: Spring Semester (Sixth Semester)

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### Fourth Year

#### Fourth Year: Fall Semester (Seventh Semester)

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#### Fourth Year: Spring Semester (Eighth Semester)

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S.Tot. = 5  
Sem. Total: 17 28  
Cum. Total: 146 238

C.Tot.=40
ELECTIVES

A. Non-technical Electives

Non-technical electives approved by the department are announced at the beginning of each semester. Students can choose any of those courses announced as a non-technical elective.

B. Area Electives

Area elective courses offered by the Computer Engineering Department are announced by the Department at the beginning of each semester. A list of area elective courses is given below. The Department may add further courses to this list. In addition to these courses, at the beginning of each semester, the Department will list courses offered by other Engineering Faculty Departments that may be chosen as area electives. Registration to such courses will require Departmental consent.

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<tr>
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<td>CMPE 476</td>
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SUMMER TRAINING

As a part of the fulfilment of the graduation requirements, all students must complete 40 work days of summer training after the second and/or third year, during summer vacations. The summer training should be carried out in accordance with the rules and regulations set by the department.

(CMPE 400 Summer Training (40 work days) (-, -) 0 3rd/4th year standing)
II. UNDERGRADUATE COURSES (COURSE DESCRIPTIONS)

CMPE 100 Introduction to Profession

A series of seminars are held in current topics and areas of specialization in Computer Engineering. Speakers are invited from different departments of EMU including Computer Engineering Department or other International Universities, Industry and Consulting firms, to deliver seminars in all aspects of engineering that are not normally covered in the lecture courses.

CMPE 101 Foundations of Computer Engineering

This course introduces the student to the fundamental concepts of the computer engineering discipline. Topics covered include: Computers and information processing - notion of computers, concepts of data and information, applications of computers, history of computing, computer hardware - CPU, memory, input/output interface, secondary storage, ports, types of computer systems, computer software - system software, utilities, application software, data communication, an overview of operating systems. General Problem Solving Concepts: basic data types, constants and variables, basic operators and expressions, algorithms, pseudo codes, and flow charts, sequential, and conditional problem solving (IF statements and CASE logic), looping (WHILE/WHILE-END, REPEAT-UNTIL, FOR structures), formatted output, examples in C programming language. (Pre-requisite: none)

CMPE 112 Programming Fundamentals

An overview of C programming language, Sequential structure Data types and classes of data, arithmetic operators and expressions, assignment statements, type conversions, simple I/O functions (printf, scanf, fprintf, fscanf, gets, puts, fgets, fputs). Selective structure Relational operators, logical operators, conditional expression operator, conditional statements (if, switch). Repetitive structures While, do-while, for loops, loop interruptions (goto, break, continue), Null statement, comma operator. Functions Function definition and function call, external variables, storage classes, recursion. Arrays Array declaration, array initialization, arrays as function arguments. Pointers Basics of pointers, functions and pointers, arrays and pointers, strings and pointers, library functions for processing strings, pointer arrays. Structures Basics of structures, structures and functions, arrays of structures. (Pre-requisite: CMPE 101)

CMPE 211 Object-Oriented Programming

Basics of C++ and Control structures. Program design, Object-Oriented programming and its specific features. Layout of a simple C++ program (elementary C++ programming. Fundamental types, scope. Overview of selection and iteration structures of C and C++ languages. Examples of C++ programs. Functions and Arrays. Review of functions and arrays. Prototypes (declarations), function definition, function overloading, inline functions, scope resolution operator (:), call-by-value, call-by-reference (reference parameters), default arguments, array declarations, operations on arrays, using arrays as function arguments. Pointers, C strings and C++ strings. Pointer variables, declaration and initialization. Use of pointers in call-by-reference function calls, returning a reference, arrays of pointers, pointers to arrays, pointers to functions, dynamic memory allocation with C++ operators new and delete, C-strings, input/output operations, standard C-string functions, formatted and unformatted input/output, C++ string type (the standard string class). Classes and Data abstraction. Structure definition, accessing members of structures, class declarations, constructors, constructor initialization lists. Class destructor, member access specifiers public and private, const member functions, friend functions and classes, static data and function members. Operator Overloading. Fundamentals and restrictions of operator overloading, this pointer, overloading unary and binary operators. Composition and Inheritance. Base classes and derived classes, protected class members, virtual functions and polymorphism, virtual destructors, private access vs. protected access, abstract base classes. Revision of the material discussed in the course. (Pre-requisite: CMPE 112)

CMPE 223 Digital Logic Design

Binary Systems (Binary Numbers, Octal and Hexadecimal Numbers, Number Base Conversions, Complements, Signed Binary Numbers, Binary Codes, Binary Logic). Boolean Algebra and Logic Gates (Basic Definitions, Basic Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, ICs). Simplification of Boolean Functions (The Map Method, Tow-and Three- Variable maps, Four- and Five- Variable Maps, Product of Sums Simplification, NAND and NOR Implementation,
CMPE 224  Digital Logic Systems       (4, 1) 4

CMPE 226  Electronics for Computer Engineers     (4, 1) 4

CMPE 231  Data Structures       (4, 1) 4

CMPE 242  Operating Systems       (4, 1) 4
Operating system definition, simple batch systems, multiprogramming, time-sharing, personal computer systems, parallel systems. Introduction to process, process scheduling, operations on processes, cooperating processes, interprocess communications, interrupts, process synchronization, critical-section problem, atomic instructions, semaphores, synchronization problems, CPU scheduling, scheduling criteria and algorithms, multiple processes and real-time scheduling, algorithm evaluation, deadlocks, characterization and handling of deadlocks, deadlock prevention avoidance and detection, deadlock recovery, memory management and virtual memory, address spaces, swapping, memory allocation, paging, segmentation, file-systems, file concepts, access methods, directory structure. (Pre-requisite: CMPE 112)
CMPE 318  Principles of Programming Languages  (4, 1) 4
Formal specification of programming languages: syntax, analysis, and semantics; evolution of programming languages and concepts; names and scope; data representation; evaluation sequence in expression, statement, and subprogram levels; OO implementation issues: abstraction, inheritance, polymorphism, concurrency and exception handling; sampling of other paradigms such as functional, logical, scripting, high-performance, etc. as time permits. Weekly homework and lab work are assigned in parallel to lectures. (Pre-requisite: CMPE 211)

CMPE321 Basics of Signals and Systems  (4, 1) 4
Fundamental concepts of signals and systems for computer engineers with focus on discrete-time systems. Sinusoids, complex numbers, spectrum representation, sampling, frequency response, filters, and the z-Transform. Digital signal processing of multimedia signals. Key ideas are reinforced through MATLAB-based laboratory work. (Pre-requisite: CMPE 226)

CMPE 323 Microprocessors  (4, 1) 4
Introduction to computing: Inside the computer, CPU-RAM-ROM. 80x86 microprocessor: short history, registers, mov and add instructions, program segments, data segments, logical and physical addresses, stack, push, pop, flag register, addressing modes. Assembly Language Programming: Directives, .asm, .lst, .obj, .map, linking, and .exe files, control transfer instructions, data types and data definition. Arithmetic Logic Instructions: unsigned multiplication and division, unsigned, signed, bcd, packed-bcd and ascii number conversion, rotate and shift instructions. Bios and DOS programming: bios display and keyboard interrupts. int 21h dos function calls. Macro definitions: mouse button and cursor position. 8088 PC/XT expansion slot, 80286 and the ISA bus, Memory and memory interfacing: EPROM, SRAM and DRAM devices, address decoding circuits, ISA bus memory interfacing. Memory mapped and Isolated I/O methods and device interfacing: ISA bus I/O address decoding and simple I/O ports, Programmable Peripheral Interface 8255 and LED, 7-segment-display, switch, button, keypad, stepper motor interfacing. D/A converters, A/D converters. Hardware Interrupts: NMI and INTR pins, interrupt servicing and TSR programs. Serial Data Communication and 8251 USART. (Pre-requisite: CMPE 224)

CMPE 324 Computer Architecture and Organization  (4, 1) 4
Introduction to RISC architecture, MIPS Instruction set: Representing instructions in the computer, Linkers, Supporting procedures in computer hardware, Passing the arguments to a procedure, Constant or immediate operands in MIPS, Addressing in branches and jumps in MIPS, MIPS addressing modes, MIPS assembly program. Integer Arithmetics: Negative number representations, Addition and subtraction, Logic operations, Constructing the Arithmetic Logic Unit (ALU), Multiplication algorithms, Division algorithms, Floating point arithmetic algorithms. Design Performance Measures: CPU performance, Evaluating the performance. Processor Data path: Logic conventions and coding, MIPS single clock cycle implementation: (Building a datapath). The simple implementation scheme, The multiple clock cycle implementation: Designing the control unit for the multiple clock cycle implementation: Finite state machines (FSM) and Microprogramming. Enhancing Performance with Pipelining: A pipelined datapath, Pipelined control, Data hazards, Control for data hazards, Reducing data hazards, Branch hazards, Exceptions, Performance of pipelined systems. (Pre-requisite: CMPE 224)

CMPE 343 Systems Programming  (4, 1) 4
Windows operating systems. TCP and UDP sockets for network communication in Windows environment. (Pre-requisite: CMPE 242)

**CMPE 344  Computer Networks**  
(4, 1) 4  

**CMPE 354  Database Management Systems**  
(4, 1) 4  
This course introduces the student to the fundamentals of database management. Topics covered include: the Entity-Relationship model; the Relational model and its mathematical foundations; most important features of Structured Query Language (including basic structure, aggregate functions, nested queries, index definition, stored procedures and functions, views, database modification, domain constraints, assertions, triggers, transaction definition, data definition language, granting privileges, security), query languages Datalog and QBE; Object-Oriented and Object-Relational databases; design principles of Relational databases (normal forms, functional dependencies, decomposition). (Pre-requisite: CMPE 231)

**CMPE 371  Analysis of Algorithms**  
(4, 1) 4  

**CMPE 400  Summer Training**  
(-, -) 0  
As a part of the fulfillment of the graduation requirements, all students must complete 40 work days of summer training after the second and/or third year, during summer vacations. The summer training should be carried out in accordance with the rules and regulations set by the department. (3rd/4th year standing)

**CMPE 405  Graduation Project I/II**  
(-, -) 1  
The main aim of this course is to involve a student, as a team member and under the supervision of an instructor, in a preferably interdisciplinary capstone design project. The project, to be completed in CMPE406, includes a technical survey, the problem description and formulation, and detailed preliminary design documentation for the solution of a realistic computer engineering problem. It is an extended exercise in the professional application of the skills and experience gained in the undergraduate program. Students form teams, and each team chooses exactly one topic proposed by course instructors, and is expected to present its progress in the form of reports and presentation, both during the semester and at the end of the semester.

**CMPE 406  Graduation Project II/II**  
(-, -) 3  
This course is the sequel to CMPE405. It consists in the implementation of a realistic, preferably interdisciplinary, engineering capstone project emphasizing engineering design principles on a computer engineering topic. It is carried out by a team of students under the
supervision of an instructor. The team must complete the detailed design and implementation of the preliminary design they started in the CMPE 405 course. It is an extended exercise in the professional application of the skills and experience gained in the undergraduate program. The team has to make a presentation and submit a detailed final report which documents the design, implementation and testing. (Pre-requisite: CMPE 405)

**CMPE 412 Software Engineering (4, 1) 4**

The software life cycle and the phases in software development: Project scheduling, feasibility study, analysis, specification, design, implementation, testing, quality assurance, documentation, maintenance. Management issues: Planning, organization, control. Also included are formal specification techniques, structured programming, modular system design and other current issues. (Pre-requisite: CMPE 231)

**CMPE 413 Compiler Construction (4, 1) 4**

This area elective course mainly focuses on the following topics; Introduction to compilers, A simple one-pass compiler, Lexical analysis, Syntactic specification of programming languages, The parsing problem, top-down and bottom-up parsing, Syntax-directed translation, Symbol tables, Run time environment and storage administration, Code generation and optimization, Compiler development (Pre-requisite: CMPE 318)

**CMPE 414 Modern Programming Platforms (4, 1) 4**

This course covers software development in the .Net framework and the C# programming language that makes full use of this framework and has all the important features that a modern language should have. The topics include the philosophy of the .Net framework and the .Net class library, object-oriented programming, event handling, graphical user interfaces, graphics and media, multithreading, exception handling, strings and characters, files and database connections. (Pre-requisite: CMPE 211)

**CMPE 415 Visual Programming (4, 1) 4**

The main concern of this course is to teach Graphical User Interface, event-driven programming and object-oriented programming for Windows and Internet environments with a visual programming language. Windows Presentation Foundation (WPF) Graphical User Interface, WPF Graphics and Multimedia, XML and XAML, Strings, and Database and Web Application development will also be introduced. (Pre-requisite: CMPE 354)

**CMPE 416 Object-Oriented Programming and Graphical User Interfaces (4, 1) 4**

The purpose of this course is to expose the Object Oriented Programming approach and its use in building Graphical User Interfaces. It will be done in fact through the presentation of the JAVA language. The student is to learn the language structure of JAVA, its object oriented aspect, the similarities and differences with C. He must also acquire a practical programming experience in JAVA through a number of exercises and projects. Concerning the applications of the language, we will focus on the implementation of Graphical User Interfaces as well as animation programs. Blueprints and a practical object oriented development methodology will be given for such applications. (Pre-requisite: CMPE 211)

**CMPE 417 Advanced Topics in C (4, 1) 4**

New C99 Standard (ISO/IEC 9899:1999). Historical notes (ANSI C committee & Numerical C Extensions Group, NCEG), borrowings from C++, new keywords and new types, headers stdint.h and inttypes.h, implicit/explicit int type, conversion specifiers in functions printf( ) and scanf( ), new preprocessor features, variable length arrays (VLA), designated initializers, declarations and executable statements within the block, etc. C Interfaces and Implementations. Memory management (automatic storage, static storage, POD and non-POD objects, new and delete operators (C++) – examples of usage, guidelines for effective memory management). Key facts about pointers, using heap and stack, dynamic arrays, common memory usage errors, restricted pointers, pointers to functions, pointers to members (C++). Date and Time Library. Retrieving current time, breaking into tokens, time differences and time zones, measuring execution time. Traditional Error-handling methods. C-based Approaches to Handling Errors (exit( )/exitit( ) , assert( ), return, setjmp( )/ longjmp( ) ). Reliability of the code. Exceptions and Assertions. Exceptions and Performance. Misuses of Exception Handling. Manual code optimization. Exceptions during construction and destruction (C++). Advanced Exception handling Techniques (C++). Rapid Sorting Techniques. Sorting Algorithms (fundamentals). Brief discussion of Insertion, Shell, Quick, etc. sorting techniques. Comparison and implementations. (Pre-requisite: CMPE 211)
CMPE 418  Internet Programming  
As the part played by Internet in our daily life increases so does the importance of methods and means of Web site realization. This course is devoted to a survey Web site preparation, considering both client- and server-side programming. Special emphasis will be assigned to mark-up and scripting languages. Participant of the course will learn XHTML and XML with style considerations, Web site scripting and salient features of C# language for the purpose: Microsoft .Net technology and server-side programming through ASP.Net. Web forms, control and Web services will as well be covered. Participant of the course will be required to carry out practical work in terms of assignments and small projects. (Pre-requisite: CMPE354)

CMPE 421  Parallel Computer Architecture  
This course discusses various processing techniques used to improve the performance of computing systems. MIPS architecture is considered as an example to Pipelined processing. Memory issues and cache memories are discussed, followed by main topics of parallel processing including a taxonomy of parallel computers, interconnection schemes, single-bus MIMD's and networked MIMD's. Memory bottleneck, memory consistency models and cache coherence issues are also considered. (Pre-requisite: CMPE 324)

CMPE 422  Microprocessor Systems  
This unit aims to study the main aspects in microprocessor systems; Microprocessors: CISC and RISC microprocessor concepts. The Intel 80386 microprocessor: Addressing and memory, segmentation, and protection mechanisms. Tasking, virtual memory, and exceptions. The Motorola 68030 microprocessor: The user programming model. The 68030 supervisor state. (Pre-requisite: CMPE 323)

CMPE 423  Embedded System Design  
The objective of the course is to introduce the concept of Harvard + RISC architecture microcontrollers and design of embedded computing systems on typical applications including interrupts, timers, LCD and LED displays, keypads, a/d converters, rotary coders, stepper motors, serial and parallel communication interfacing. The design applications are introduced on a very widely used typical 16-bit embedded microcontroller unit, PIC18F452. The scope of the course is the simple, distinct PIC18F452 embedded system design with the applications in C and RISC assembly programming. The design/theory scale of the course is around 60/40. (Pre-requisites: CMPE 224)

CMPE 424  Speech and Image Processing  
Signal definition and processing, time and frequency representation, Fourier representation of signals, discrete-time systems, linear time-invariant systems, digital processing of speech and image signals, speech production mechanism, representation of speech and image signals as discrete-time sequences, basic properties of speech and image signals, auto- and cross-correlation in speech and image signals, voiced unvoiced classification of speech, linear prediction and pitch extraction of speech, applications of speech processing, coding of speech signal, representation of colors, histogram operations, image transformations, edge detection, image interpolation, image compression, warping and morphing. (Pre-requisite: CMPE 321)

CMPE 426  Digital Signal Processing  
Course topics are as follows: Discrete-Time Signals, Discrete-Time Systems, Z-Transform, Frequency analysis of Continuous-Time and Discrete-Time Signals, Frequency Domain Sampling, The Discrete Fourier Transform (DFT), Efficient Computation of the DFT: FFT Algorithms, Realization of Discrete-Time Systems, Design of FIR and IIR digital Filters, Adaptive digital filtering applications. Course objective is to introduce the fundamentals of digital signal processing. The emphasis will be on analysis tools, the design of digital filters, and on the computation of the Discrete Fourier Transform (DFT). The theory developed in class will be confirmed by computer programming using MATLAB simulation package. (Pre-requisite: CMPE 321)
CMPE 427  Hardware Realization of Algorithms  

The course introduces students to the key ideas and concepts of fast hardware implementation of algorithms in contrast to software realization. The organization of designing hardware is studied including hardware description languages, hardware-oriented algorithms and CAD-systems for FPGA implementation. Active student participation is expected for the successful completion of this course. Students must attend the lectures regularly and are responsible for all the reading assignments, homework, quizzes and other materials discussed in class. (Pre-requisite: CMPE 224)

CMPE 443 Real-time System Design  

Course goal is to introduce students to key ideas, concepts and tools of Real-time systems design. Introduction to real-time systems, ADA programming, architecture and design of real-time systems, concurrent programming and synchronization, real-time scheduling, reliability and exception handling, real-time OS, and distributed real-time systems. (Pre-requisite: CMPE 242)

CMPE 444 Data Communications  

This course concentrates on the exchange of data between devices. The key aspects of transmission, interfacing, link control, and multiplexing will be examined. The course then will proceed with wide area networks in examining the internal mechanisms and user network interfaces that have been developed to support voice, data, and multimedia communications. The traditional technologies of packet switching and circuit switching will be examined, as well as the more recent ATM. (Pre-requisite: CMPE 344)

CMPE 445 Internet Architecture and Protocols  


CMPE 446 Networked computing  

Peer-to-peer (P2P) systems, Grids and Web services represent recent innovations in distributed networking computing on top of the Internet. In particular, in a P2P system, interacting entities are peer processes that perform in collaboration a broad range of tasks on remote data discovery, storage and management. Grid represents a distributed computing infrastructure for accessing computing resources for advanced science and engineering. Together, on the base of computing resources, that are available in the Internet, these technologies can be used to create a globally distributed and coordinated environment for the solution of those information processing tasks that require a huge size of memory and a super-high throughput. This course aims to give undergraduates the basic knowledge of these technologies and prepare students for a range of careers within this emerging area of the global networked computing industry. The course brings together information related to P2P systems, Grids and Web services. It will show, how these technologies can be used in science, research and industry. The experience, obtained by students during this course is a prerequisite for any professional work related to the design, implementation and usage of the highly effective networked computing systems and distributed applications. (Pre-requisite: CMPE 344)

CMPE 447 Fiber Optic Computer Communication  

This course will describe the basic principles of fiber optics, light propagation theories, attenuation of optical fibers, dispersion and dispersion compensation of fiber optics. In addition, optical fiber transmitters, receivers and fiber optic system design are also discussed. Finally, an introduction to fiber optic network is considered. (Pre-requisite: CMPE 344)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPE 461</td>
<td>Artificial Intelligence</td>
<td>(4, 1) 4</td>
</tr>
<tr>
<td></td>
<td>This undergraduate-level course introduces the basic concepts of artificial intelligence (AI). General understanding of basic concepts with emphasis on the agent perspective to artificial intelligence through intelligent agents, blind and informed search algorithms, constraint satisfaction, reasoning, and knowledge representation, are the major goals in the preparation of lectures and practical laboratory works. Active student participation is necessary in both lecture and laboratories. The students, by the end of this course, are expected to identify the uses of basic techniques in different fields of computer engineering. (Pre-requisite: CMPE 231)</td>
<td></td>
</tr>
<tr>
<td>CMPE 462</td>
<td>Functional and Logic Programming</td>
<td>(4, 1) 4</td>
</tr>
<tr>
<td></td>
<td>This course is about the two main declarative programming paradigms, namely functional and logic. Prolog will be taught as a representative of the Logic programming paradigm, and ML will be the language used to demonstrate the functional paradigm. (Pre-requisite: CMPE 218)</td>
<td></td>
</tr>
<tr>
<td>CMPE 466</td>
<td>Computer Graphics</td>
<td>(4, 1) 4</td>
</tr>
<tr>
<td></td>
<td>This course studies; computational geometry, curve, surface and object representations, geometric transformations, three dimensional graphics, color, shading, shadowing, hidden line elimination, surface removal, anti-aliasing, digitizing and scanning, display algorithms, graphics hardware, display devices.. (Pre-requisite: CMPE 211)</td>
<td></td>
</tr>
<tr>
<td>CMPE 471</td>
<td>Automata Theory</td>
<td>(4, 1) 4</td>
</tr>
<tr>
<td>CMPE 474</td>
<td>Performance Analysis of Computer Systems and Networks</td>
<td>(4, 1) 4</td>
</tr>
<tr>
<td>CMPE 475</td>
<td>Operations Research</td>
<td>(4, 1) 4</td>
</tr>
<tr>
<td></td>
<td>This course focuses on: Linear programming. Solution techniques of linear programs. The transportation problem. Project scheduling by critical path method. Nonlinear programming. Integer programming. (Pre-requisite: MATH 241)</td>
<td></td>
</tr>
<tr>
<td>CMPE 476</td>
<td>System Simulation</td>
<td>(4, 1) 4</td>
</tr>
</tbody>
</table>
MATH 151  Calculus I
(4, 1) 4

MATH 152 Calculus II
(4, 1) 4

MATH 163  Discrete Mathematics
(3, 1) 3
Set theory, functions and relations; introduction to set theory, functions and relations, inductive proofs and recursive definitions. Combinatorics; basic counting rules, permutations, combinations, allocation problems, selection problems, the pigeonhole principle, the principle of inclusion and exclusion. Generating functions; ordinary generating functions and their applications. Recurrence relations; homogeneous recurrence relations, inhomogeneous recurrence relations, recurrence relations and generating functions, analysis of algorithms. Propositional calculus and boolean algebra; basic boolean functions, digital logic gates, minterm and maxterm expansions, the basic theorems of boolean algebra, simplifying boolean function with karnaugh maps. Graphs and trees; adjacency matrices, incidence matrices. eulerian graphs, hamiltonian graphs, colored graphs, planar graphs, spanning trees, minimal spanning trees, Prim's algorithm, shortest path problems, Dijkstra's algorithms. (Pre-requisite: none)

MATH 241  Linear Algebra and Ordinary Differential Equations
(4, 1) 4
Linear Algebra; Matrix algebra, special matrices and row operations, Gaussian elimination method, determinants, adjoint and inverse matrices, Cramer's rule, linear vector spaces, linear independence, basis and dimension. First order ordinary differential equations; definitions and general properties of solutions, separable, homogeneous and linear equations, exact equations and integration factors. Higher order equations with constant coefficients; Basic theory and the method of reduction of order, second order homogeneous equations with constant coefficients, nonhomogeneous equations, the method of undetermined coefficients, the method of variation of parameters, the Cauchy-Euler equations. Power series solutions; classification of points, ordinary and singular points, power series solutions about ordinary points, power series solutions about regular singular points, the method of frobenius. Systems of differential equations; general properties of constant coefficient systems, eigenvalues and eigenvectors, diagonalizable matrices, solutions of linear systems with constant coefficients. Boundary value problems. (Pre-requisite: MATH 152)

MATH 322  Probability and Statistical Methods
(3, 1) 3

MATH 373  Numerical Analysis for Engineers
(3, 1) 3

PHYS 101  Physics I
(4, 1) 4
PHYS 102  Physics II  

ENGL 191  Communication in English – I  
The contents of the GEED192 course do not appear to exclusively focus on English language development. Instead they are becoming tutorials for the Critical Thinking Skills Courses. (Pre-requisite: none)

ENGL 192  Communication in English – II  
The contents of the GEED192 course do not appear to exclusively focus on English language development. Instead they are becoming tutorials for the Critical Thinking Skills Courses. (Pre-requisite: ENGL191)

EFL 201  Communications Skills  
EFL 201/203/205 is a second year Basic/Mainstream/Advanced Communication Skills course for students at the Faculty of Engineering. The course aims to introduce a range of skills, including effective written and oral communication, research skills and study skills. Throughout the course the students will be involved in project work intended to help them in their immediate and future academic and professional life. This will include library research, technical report writing and an oral presentation. By investigating a topic of their own choice, students will develop their understanding of independent research skills. During the report writing process, students will improve their writing and develop the ability to produce organized, cohesive work. The oral presentation aims to enhance spoken fluency and accuracy and provide training in the components of a good presentation. (Pre-requisite: ENGL192)

IE 355  Ethics in Engineering  
This course is designed to introduce moral rights and responsibilities of engineers in relation to society, employers, colleagues and clients. Analysis of ethical and value conflict in modern engineering practice. Importance of intellectual property rights and conflicting interests. Ethical aspects in engineering design, manufacturing and operations. Cost benefit-risk analysis, safety and occupational hazard considerations. (Pre-requisite: none)

IE 420  Engineering Economy  

IE 450  Industrial Management  
The objective of this course is to equip engineers with the necessary modern managerial skills, which are essential to increase productivity in organizations through employee empowerment and effective communication, to develop plans that will put the organization ahead of the international marketing game, to overcome obstacles to personal and professional growth, to attain organizational strategic goals, and to develop action plans for organizational change. (Pre-requisite: none)

HIST 280  History of Turkish Reforms  
A history of the foundation of the Turkish Republic under the light of Kemal Atatürk's principles. A required course for all Turkish students (This course is given in Turkish). (Pre-requisite: none)

TUSL 181  Introduction to Turkish Language  
TURK 100/199 is a Basic Turkish course introducing the Turkish language. It incorporates all four language skills and provides an introduction to basic grammar structures. Students will be encouraged to develop their writing skills through a variety of tasks. The aim of this course is for students to be able to understand and communicate in everyday situations, both in the classroom and in a Turkish-speaking environment. (Pre-requisite: none)
III. LABORATORIES

Undergraduate Computer Laboratories
Laboratories are for undergraduate courses provide a wide range of software tools to students for various computing needs in courses and projects. These laboratories are equipped with more than 350 networked Pentium personal computers, with connections to file and print servers, as well as to the Internet. Students can access Novell Netware, Windows NT, UNIX and LINUX servers from these laboratories.

Undergraduate Research/Project Laboratory
This laboratory is used for project and research studies of 4th year students. PC’s in this lab have hard disks and multimedia support.

Computer Research Laboratory
This laboratory provides general-purpose research facilities under various software platforms for graduate students.

Electric and Electronics Laboratory
This laboratory provides facilities for performing experiments on electrical circuits and basic electronics. It includes voltmeters, ammeters, signal generators, power supplies, oscilloscopes and relevant discrete components.

Logic Design Laboratory
Intended for teaching the fundamentals of combinatorial and sequential logic circuits. The equipment includes construction boards with power supplies, clock generators, LED displays and IC’s.

Microprocessor Laboratory
Provides facilities for performing experiments on microprocessors and single-board microcomputers. The equipment includes evaluation kits, 80386 based PC/AT interface experimental boards and PC’s. The kits incorporate EPROM programmers, parallel and serial input/output ports, keyboard and displays, stepper and DC motors, DAC’s and ADC’s and relevant IC’s.
REGISTRATION

The Academic Advisor
Each student is assigned an Academic Advisor who assists the student with matters related to course selection, registration, and scheduling. The advisor plays a key role in the student's progress through University studies, but it is ultimately the student's responsibility to meet all University requirements, and it is the responsibility of the Office of the Registrar to ascertain and certify that these requirements have been met.

Students must obtain their advisors' approval for registration, selection of core and elective courses, adding, dropping, or withdrawing courses.

Registration Procedure

A) Course Registration Procedure

Please go to one of the following access points with your 'ID card' and 'bank receipt' to obtain access for course registration.

- Department of Computer Engineering
- Faculty of Communication and Media Studies Building
- Registrar’s Office
- Accounting Office

Please go to your academic advisor at your department to complete your registration.

Important Notes:
- Course registration is complete when you see your advisor face-to-face and he/she confirms your registration on the computer.
- Students who do not take access cannot complete their registration.
- You can learn the tuition fee or any debts that needs to be settled from http://students.emu.edu.tr
- Students have to register for courses in person. Please do not ask your friend(s) to do it for you and do not give anyone "power of attorney". It will not be accepted.
- Students, who complete their registration after COURSE REGISTRATION period, should pay penalty per day even they did pay their tuition fees earlier.
- In case of problem, please go directly to the Registrar’s Office.

B) On-Line Course Registration Procedure

Access to online registration: http://students.emu.edu.tr
Please log on to this web site and choose your courses online. Then, get online confirmation from your advisor regarding your course selection.

Your course registration will be completed when your advisor will confirm online. However, you will also need to see your advisor face to face before the date that will be announce to get the final approval for your course registration. (Students who will not take approval from their advisor until the specified date will have to pay late registration penalty starting from the very beginning of registration).

Important Notes:
- Students who do not take access cannot register online.
- Access is opened automatically in 24 - 48 hours following the payment to the bank.
- You can learn the tuition fee or any depts. That needs to be settled from http://students.emu.edu.tr
- Students who do not take approval from their advisor until the specified date are required to pay late registration penalty per day starting from very beginning of registration.
- In case of problem, please go directly to the Registration's Office.
- Master/PhD students and first semester, freshman undergraduate students, cannot register online.

Late Registration

Students who have not completed formal registration processes during the scheduled period may be permitted to register late with a late registration penalty, if the delay has been involuntary.
Registration Changes

a) Adding Courses

With the approval of their Academic Advisor and the Chairman of the Department, students may request addition of courses to their schedule during the first two weeks of classes in a regular term. Such requests will be granted if:

1) The maximum allowable student course load is not exceeded;
2) Added courses can be scheduled properly.

b) Dropping Courses

With the approval of his/her Academic Advisor and the Chairman of the Department, a student may drop courses from his/her schedule during the first two weeks of classes in a regular term.

c) Withdrawing from a Course

Course withdrawal may take place not later than the week of the semester announced in the academic calendar, with the approval of the Academic Advisor and the Chairman of the Department. A student who withdraws from a course will receive a “W” grade on his/her transcript. Such courses must be registered again in the following semester.

TRANSFERS

Transfer from another Academic Institution

A student, who has completed at least one academic semester of an equivalent program at another university, may apply for transfer to the Computer Engineering Department. Such an application will be considered provided the applicant:

a) has not been dismissed from that institution, either on academic or any other grounds,
b) has an adequate knowledge of English, and
c) the quota for transfer students has not been exceeded.

A transfer student may be exempted from certain courses. Decisions concerning exemption will be made by the Transfer Committee of the Department.

Transfer applications can only be made for entry to the second, third, fourth or fifth academic terms, and thus the student is required to complete at least one-half of the total course load requirement at EMU.

Transfer within the University

Transfer from another four year degree program to Computer Engineering may be permitted, if the student has successfully completed at least one term of study in a department (English Preparatory School is not counted); and if the quota for transfer students has not been exceeded. Students who already made one internal transfer before or students who have an academic warning are not eligible for application.

A student may transfer to a two-year diploma program with the consent of the Director of the two-year program concerned.

A two-year diploma program student who graduates with a high cumulative grade-point average may apply for transfer to the first year of the Computer Engineering four-year degree program.
COURSE-LOAD AND ASSESSMENT

The Academic Year
Academic activities take place in an “Academic Year”, from the end of September to the end of June, consisting of two periods of at least 16 weeks each, possibly followed by a "Summer Session". The two periods of study are referred to as the "Fall" and "Spring" semesters. There is a two to three weeks of break between the two semesters. Summer sessions are offered in July and August.

The Academic Term
The current academic term of a student is determined by the cumulative credited courses he/she registered to during his/her whole period of studies at EMU. The total course load is distributed over eight academic terms, and four academic years.

Courses
Courses consist of two to four hours of instruction and, where appropriate, tutorial and laboratory work, for each week of the Fall or Spring semester; or the equivalent total number of hours per week in a Summer session.

The Credit-Hour
Courses offered for academic credit are described in terms of a number that is proportional to the academic involvement they required from the student. This number is called the “Credit-Hour.”

For each course, one credit hour is equivalent to one lecture hour per week. Any additional hour that may be required for preparation outside the class, or any additional hour required for laboratory or tutorial work, is considered to be equivalent to one-third of a credit-hour.

A course consisting of both lecture and laboratory/tutorial sessions, meeting for 3 lecture hours and 2 laboratory/tutorial hours per week would be assigned 4 credit-hours. It would receive a credit rating of “(3,2)4,” where the first digit indicates the weekly lecture hours, the second digit the weekly laboratory/tutorial hours, and the last the credit-hours associated with the course.

Prerequisite Courses
Prerequisite course requirements are given in parentheses at the end of each course description, if applicable. They are also shown in the tabular undergraduate curriculum. When course A is a prerequisite to course B, a student can not register to course B before passing from course A.

The Course Load
The semester course load is defined as the number of credit-courses for which a student is registered in a semester. The regular course load for Computer Engineering students varies between 5 and 6 credited courses, depending upon the academic term of the student. A student may increase it by at most one credited course, if he/she has a high GPA and CGPA, with the approval of his/her Academic Advisor and the Chairman of the Department. A student may reduce his/her load by at most two credited courses. However, these courses must be completed by the following semester if offered. A student who is in his/her last academic term (graduation term) may be permitted to register for course loads deemed appropriate by his/her Academic Advisor, and with the approval of the Chairman of the Department. During a Summer Session, students may carry loads from 1 to 2 credited courses.

Course Grades and Grade-Points
Thirteen categories of scholastic achievement, ranging from “superior” to “failure” (A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F, NG), are recognized as valid end-of-course grades or letter grades. These grades are indexed on a scale of “0 to 4”, termed “Grade-Points”. The symbol “NG” (Nil Grade) indicates poor attendance and/or a failure to complete assigned work (including exams). The letter grades are indexed to Grade-Point equivalents as follows: A=4.0; A-=3.7; B+=3.3; B=3.0; B-=2.7; C+=2.3; C=2.0; C-=1.7; D+=1.3; D=1.0; D-=0.7; F=0.0; NG=0.0.

Four other symbols are also used in grading, for special circumstances. “W” (withdrawn), indicates withdrawal from a course before the end of a term. In case where a student has been authorized to delay completion of course work past the normal end-of-term, the “I” (incomplete) grade may be given until a formal grade is reported. Achievement in a non-credit-hour course is indicated by the symbol “S” (satisfactory) or “U” (unsatisfactory). In the case of repeated course work, the last grade earned is considered the official course grade. No grade-point equivalent is assigned for the notations I, W, S, and U.
Credits Earned
A student earns credits based on the level of his/her achievement in a course. The credits earned are the product obtained by multiplication of the “Credit-Hour” and the “Grade-Point” obtained. For example, if a student gets grade A- for a 4-credit course, then the credits earned for that course is 4*3.7=14.8.

The Grade-Point Average: GPA
A student’s academic achievement for each semester is expressed numerically by a real number referred to as the “Grade Point Average” (GPA). The GPA is obtained by:

1. calculating credits earned for each course,
2. adding these earned credits for all courses in the semester to obtain the total credits, and
3. dividing the total credits by the total credit-hours registered in that semester.

The GPA can range from 0.00 to a maximum number of 4.00. A student’s GPA is calculated and reported to two decimal places.

The Cumulative Grade Point Average: CGPA
A student’s overall academic achievement is expressed by a real number called the “Cumulative Grade Point Average” (CGPA). The CGPA is obtained by:

1. adding the credits earned in each completed semester to find the total credits earned,
2. adding credit-hours registered in all completed semester to find the total credit-hours registered, and
3. dividing the total credits earned by the total credit-hours attempted.

When a course is repeated, the last credit earned is substituted in place of the previous value.

Example:
Assume that a student is registered the following courses and got the following grades.

<table>
<thead>
<tr>
<th>Semester I:</th>
<th>Semester II:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td>Grade</td>
</tr>
<tr>
<td>CMPE 101</td>
<td>B-</td>
</tr>
<tr>
<td>MATH 163</td>
<td>D-</td>
</tr>
<tr>
<td>ENGL 191</td>
<td>D</td>
</tr>
<tr>
<td>MATH 151</td>
<td>C</td>
</tr>
<tr>
<td>PHYS 101</td>
<td>F</td>
</tr>
</tbody>
</table>

Total of new credits = 10

Credits earned = 3*2.7+3*0.7+3*1+4*2+4*0
= 21.2
GPA = 21.2 / 17 = 1.25
CGPA = 21.2 / 17 = 1.25

Credits earned = 3*3.3+3*3+3*1+4*2.3+4*1
= 35.1
GPA = 35.1 / 17 = 2.06
CGPA = Total credits earned / total credits registered
= 54.2 / 27 = 2.01
**ACADEMIC EVALUATION**

**Evaluation of a Course**

A course is said to have been successfully completed if a student, obtains a grade of A, A-, B+, B, B-, C+, C, C-, D+, D or S. A course in which a student receives a grade of D-, F, NG or U is not satisfactorily completed, and the student is required to repeat such a course in the next semester it is offered.

**Satisfactory/Probation/Unsatisfactory Status**

For a student registered in and after 2007-2008: her/his Satisfactory/On-Probation/Unsatisfactory Status is based on the following table:

<table>
<thead>
<tr>
<th>Actual Academic Term</th>
<th>Satisfactory (S)</th>
<th>Satisfactory Progress (Y)</th>
<th>On Probation (P)</th>
<th>Unsatisfactory (U)</th>
<th>Compulsory Transfer/DISMISS (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>2.00&gt;CPGA≥1.50</td>
<td>1.50&gt;CPGA≥1.00</td>
<td>1.00&gt;CPGA≥0.00</td>
<td>----</td>
</tr>
<tr>
<td>3</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>2.00&gt;CPGA≥1.50</td>
<td>1.50&gt;CPGA≥1.00</td>
<td>1.00&gt;CPGA≥0.00</td>
<td>----</td>
</tr>
<tr>
<td>4</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>2.00&gt;CPGA≥1.50</td>
<td>1.50&gt;CPGA≥1.00</td>
<td>1.00&gt;CPGA≥0.00</td>
<td><strong>1.00&gt;CPGA≥0.00</strong></td>
</tr>
<tr>
<td>5</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>2.00&gt;CPGA≥1.80</td>
<td>1.80&gt;CPGA≥1.50</td>
<td>1.50&gt;CPGA≥0.00</td>
<td><strong>1.00&gt;CPGA≥0.00</strong></td>
</tr>
<tr>
<td>6</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>2.00&gt;CPGA≥1.80</td>
<td>1.80&gt;CPGA≥1.50</td>
<td>1.50&gt;CPGA≥0.00</td>
<td><strong>1.00&gt;CPGA≥0.00</strong></td>
</tr>
<tr>
<td>7</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>2.00&gt;CPGA≥1.80</td>
<td>1.80&gt;CPGA≥1.50</td>
<td>1.50&gt;CPGA≥0.00</td>
<td><strong>1.00&gt;CPGA≥0.00</strong></td>
</tr>
<tr>
<td>≥8</td>
<td>4.00&gt;CPGA≥2.00</td>
<td>----</td>
<td>2.00&gt;CPGA≥1.80</td>
<td>1.80&gt;CPGA≥0.00</td>
<td><strong>1.00&gt;CPGA≥0.00</strong></td>
</tr>
</tbody>
</table>

- **Actual Academic Term** refers to the number of semesters that a student has registered so far (English Preparatory School and summer semesters are not counted).
- **On Probation status**: Student can register to a maximum of two new courses.
- **Unsatisfactory status**: Student cannot register to any new course.
- **Compulsory Transfer/DISMISS**: Students who completed a minimum of 4 academic semesters (if the fourth semester is Spring Semester, then at the end of the Summer School) and who have a CGPA below 1.00 are dismissed from the program. In case of Compulsory Transfer/DISMISS, the student may transfer to another faculty (with the same tuition fees) or may continue his education in the same program with new student registration fees.

For a student registered before 2007-2008: her/his Academic Warning(s) Status is based on the following table:

A student receives an Academic Warning if in a given semester he/she obtains a CGPA lower than the required minimum semester CGPA limit.

<table>
<thead>
<tr>
<th>Academic Term</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of the second academic term</td>
<td>1.15</td>
</tr>
<tr>
<td>At the end of the third academic term</td>
<td>1.35</td>
</tr>
<tr>
<td>At the end of the fourth academic term</td>
<td>1.55</td>
</tr>
<tr>
<td>At the end of the fifth academic term</td>
<td>1.70</td>
</tr>
<tr>
<td>At the end of the sixth academic term</td>
<td>1.80</td>
</tr>
<tr>
<td>At the end of the seventh academic term</td>
<td>1.90</td>
</tr>
</tbody>
</table>

- **Academic Term**: The current academic term of a student is determined by the cumulative credited courses he/she registered to during his/her whole period of studies at EMU. The total course load is distributed over eight academic terms, and four academic years. In other words, the semester of a student is determined by the number of courses taken so far.
- **First Academic Warning**: Student may register for a maximum of two new courses.
- **Second, Third, ... Academic Warning**: The students with Fourth Academic Warning cannot register for any new course.
- The students with Fourth Academic Warning are dismissed from the program. In this case, the student may transfer to another faculty (with the same tuition fees) or may continue his education in the same program with new student registration fees.

**Honor and High Honor Students**

A student who (with a normal course load) obtains a GPA between 3.00 and 3.49 is designated an "Honor Student". A student who obtains a GPA between 3.50 and 4.00 is designated a "High Honor Student".
Registration of Students with Academic Warning

In the semester following the first academic warning, the student will not be allowed to register for more than two new courses. The student will be asked to repeat some of the courses which he/she had already taken in the previous semesters with priority given to the grades F, NG, D-.

At the end of the semester following an academic warning, if a student's probation status continues (i.e., if he/she receives another academic warning for that semester and thus has two consecutive academic warnings) then the student will be asked to repeat courses already taken in the previous semesters, only. Such students are not allowed to register for new courses. The courses with F, NG, and D- grades are to be repeated first. The student may also be asked to repeat courses which he/she already passed with other grades. A student who receives an academic warning in three consecutive semesters failing to raise his/her CGPA above the limit receives a Final Academic Warning.

Dismiss

If a student registered before 2007-2008 and s/he received a Final Academic Warning fails to raise his/her CGPA above the limit in the following semester, he/she will be academically dismissed from the Computer Engineering Department program.

Graduation

A student is entitled to graduate if he/she:

1. Satisfactorily completes all the required course work (40 courses with credits, and other compulsory courses),
2. Completes the 40-day summer training, and
3. Attains a CGPA of at least 2.00.

If at the time of his/her graduation a student has achieved a CGPA of 3.00 or greater, this will be indicated on his/her graduation Diploma/Certificate and official transcript as follows: students with a CGPA in the range 3.00-3.49 “Honors”; students with a CGPA in the range 3.50-4.00 “High Honors”.

Graduation is conferred by the University Senate upon the request of Faculties and Schools. The Diplomas/Certificates are prepared by the Office of the Registrar, and describe the name of the program, the date of graduation, and the degree or title obtained.
ADDITIONAL REGULATIONS

Attendance Requirements
The University believes that the benefits of academic studies come not only from independent study and the preparation of materials for formal grading, but also from participation in class and laboratory activities. Regular attendance of EMU students is therefore required in all courses.

When a student fails to show regular class attendance, an EMU faculty member may report an “NG” for the student. Such action may be taken when the number of unexcused absences exceeds 20% of the total class/laboratory hours scheduled for the course. Specific rules for NG grades are announced by instructors for each course at the beginning of each semester. Students should be aware that course grades can be adversely affected through absence, whether excused or unexcused.

Leave of Absence
A student, who has an important excuse for having a break from University studies for a period of time, may appeal for leave of absence. The total duration of leaves of absence for a student can not exceed a total of four semesters during his/her studies.

Written appeals are made to the Chairman of the Department at the beginning of each semester, within five weeks of the commencement of classes. Medical cases are dealt with separately. Permission for leave of absence must be approved by the Office of the Rector upon request by the Dean/Director of the program concerned.

Withdrawal from the University
A student who wishes to withdraw from the University must initiate withdrawal procedures with the Office of the Registrar. The official withdrawal procedure requires that the student obtain clearances from the Registrar, the Library, the Bookstore, Student Housing, and the Accounting Department.

Student Transcript of Academic Record
At the end of each semester, students are provided with a copy of his/her academic records. Errors or suspected errors should be brought to the immediate attention of the Registrar. An official transcript of a student’s entire academic record will be provided upon submission of a written request from the student to the Registrar. The official transcript will be mailed by the Registrar to the intended recipient and cannot be handed directly to the student. Student copies of transcripts may also be issued upon request.

Summer Session
Summer session is organized mainly to help students with low scholastic achievement. Students may register to Summer session courses with the approval of the Department. These form periods of intensive study which last for eight weeks. The number of courses offered is based on student demand and faculty availability. The grading policy is the same as the regular terms.

Summer Training
The Computer Engineering students are encouraged to take part in industrial work/organizations relating to their fields of study. This required as part of the fulfillment of the degree program. Students are required to complete a total 40 working days of Summer Training session after finishing their second or third year of studies.

Starting from 2010-2011 academic year, students who have completed the curriculum apart from the summer training must pay 1/20 of the semester fees to register for only summer training.

Disciplinary Matters
The principles of truth and honesty are recognized as fundamental to an academic community. It is expected that both teachers and students will honor these principles. In the event of academic dishonesty or behavior that may damage University functions, disciplinary actions as described in the “Disciplinary Regulations” may be enforced by the Disciplinary Committee of the University.