

# ENGINEERING-COMPUTER (EGC)

## EGC193. Engineering Selected Topic. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

May be repeated for credit

## EGC220. Digital Logic Fundamentals. 3 Credits.

An introduction to digital logic analysis and design. Topics include: number representations used in today's digital systems and their arithmetic properties and conversion techniques; combinational switching theory of digital element networks where no feedback is present; analysis and design of clocked sequential circuits where feedback is present; and an introduction to modern programmable logic devices and their programming and synthesis techniques.

### Attributes:

- Critical Thinking Introductory

### Restrictions:

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Computer Science (513)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

### Prerequisites:

- MAT251 Minimum Grade of C-
- EGC221 Minimum Grade of C\*

\* May be taken at the same time

May not be repeated for credit

## EGC221. Digital Logic Lab. 1 Credit.

Experiments in both combinational and sequential logic design. Breadboarding, schematic capture, and Verilog implementation of digital circuits of varying complexity. Use of software tools to design FPGA based circuits.

### Restrictions:

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Computer Science (513)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

### Corequisites:

- EGC220

May not be repeated for credit

## EGC251. C/C++ Programming. 3 Credits.

A course in computer programming using high level programming languages (C/C++) as a tool to solve engineering problems. Topics include programming structure, decisions, repetition, arrays, functions, data files, addresses and pointers and object oriented design.

### Attributes:

- Information Mgmt Intro

### Restrictions:

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

### Prerequisites:

- EGG101 Minimum Grade of C-

May not be repeated for credit

## EGC293. Engr Selected Topics. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

May be repeated for credit

## EGC295. Indep Study Compr Engin. 1-12 Credits.

May be repeated for credit

## EGC320. Digital Systems Design. 3 Credits.

State minimization, assignment, and design of synchronous sequential circuits. Verilog coding. Analysis and design of asynchronous sequential circuits. PLDS. Digital system design examples. Additional topics such as design of CMOS circuits, power reduction, testing etc.

### Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

### Prerequisites:

- EGC220 Minimum Grade of C-
- EGC221 Minimum Grade of C-

May not be repeated for credit

**EGC331. Microcontroller System Design. 3 Credits.**

An introduction to Microcontroller Hardware and Software Design. Topics include organization and architecture; memory and I/O interfacing; and Assembly and C language programming. Interfacing and programming techniques with microcontroller peripherals that include: UART (Serial Communications), Counters and Timers, Interrupts, and Analog and Digital Interfacing.

**Restrictions:**

- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- EGC220 Minimum Grade of C-
- EGC221 Minimum Grade of C-
- EGC251 Minimum Grade of C-
- EGE200 Minimum Grade of C-
- EGE201 Minimum Grade of C-

**Corequisites:**

- EGC332

May not be repeated for credit

**EGC332. Microcontroller Laboratory. 1 Credit.**

Self-paced laboratory to provide hands-on experience encompassing Assembly and C programming languages and interfacing peripheral devices as applied to microcontroller systems.

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- EGC220 Minimum Grade of C-
- EGC221 Minimum Grade of C-
- EGC251 Minimum Grade of C-
- EGE200 Minimum Grade of C-
- EGE201 Minimum Grade of C-

**Corequisites:**

- EGC331

May not be repeated for credit

**EGC412. Data Communications. 3 Credits.**

A first course in Data Communications, which introduces the problems, solutions, and limitations associated with interconnecting computers by communication networks (LAN or WAN). The seven layer ISO Open Systems Interconnect (OSI) reference model serves as framework for the course with major emphasis on layers one through four (physical, data link, network, and transportation).

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- EGC331 Minimum Grade of C-

May not be repeated for credit

**EGC433. Embedded Systems. 3 Credits.**

Analysis and design processes required for utilizing advanced functionality, real-time (interrupt) interfacing, and bare-metal and RTOS programming techniques (using C) as applied to an industry standard microcontroller-based embedded system. Topics include: analog interfacing and data acquisition, sensors, actuators, signal conditioning, timers and PWM, parallel and serial interfacing, communication and networking and control concepts.

**Attributes:**

- Critical Thinking Intermediate

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- EGC331 Minimum Grade of C-
- EGC332 Minimum Grade of C-

May not be repeated for credit

### EGC442. Introduction to Computer Architecture. 3 Credits.

Computer architecture and hardware system organization are examined. Topics include performance issues, CPU organization and instruction set implementation, performance enhancement through pipelining, memory organizations, input/output structure, and an introduction to parallel architectures.

#### Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

#### Prerequisites:

- EGC331 Minimum Grade of C-
- EGC332 Minimum Grade of C-

May not be repeated for credit

### EGC445. VLSI Design. 3 Credits.

Introduction to CMOS, MOS transistor theory. IC technology and layout design rules. Design of CMOS circuits. Circuit characterization and performance estimation. Memory, clocking and input/output circuits. Microarchitecture of VLSI systems. Chip design projects. Testability.

#### Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

#### Prerequisites:

- EGC220 Minimum Grade of C- and EGC221 Minimum Grade of C-
- EGE320 Minimum Grade of C- and EGE322 Minimum Grade of C-

#### Corequisites:

- EGC446

May not be repeated for credit

### EGC446. VLSI Design Lab. 1 Credit.

Static and dynamic characteristics of CMOS logic gates. Design of CMOS circuits using transistor schematics, and verification through simulation. Layout of CMOS circuits using state-of-the-art VLSI tools, design rule check, and verification through simulation.

#### Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

#### Corequisites:

- EGC445

May not be repeated for credit

### EGC447. Functional Verification of Hardware Systems. 3 Credits.

An introduction to the hardware verification practices used in industry. Students will learn how to create architecture for test benches, object-oriented approach, stimulus generation techniques, results checking, and how to analyze coverage using SystemVerilog.

#### Attributes:

- Information Mgmt Intrmd

#### Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

#### Prerequisites:

- EGC 450 Minimum Grade of C-
- EGC455 Minimum Grade of C-

May not be repeated for credit

**EGC448. Software Defined Networks. 3 Credits.**

Broadband and Carrier Ethernet Networks and technologies. Role of SDN in defining architecture of the next generation of networks. Determination of conformance criteria for network standards and protocols to support industry solutions and applications.

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Computer Engineering AP (266)
  - Electrical Engineering (517)
  - Electrical Engineering AP (267)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- CPS210 Minimum Grade of C- or EGE331 Minimum Grade of C-

May not be repeated for credit

**EGC451. Real-Time Systems. 3 Credits.**

Practical experience of real-time operating systems (RTOS) and real-time debugging as applied to real-time embedded systems. Design and implementation of real-time embedded systems: controllers, data storage, data acquisition, and communication using a commercially available RTOS.

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- EGC433 Minimum Grade of C- or EGC 416 Minimum Grade of C-

May not be repeated for credit

**EGC455. Design and Verification of System on Chip. 3 Credits.**

System-on-chip (SoC) design and verification, IP (intellectual property) reuse in design and verification, hardware/software co-design, embedded software, functional verification using SystemVerilog and Universal Verification Methodology (UVM).

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Engineering (EGG)
  - Mechanical Engineering (521)

**Prerequisites:**

- EGC320 Minimum Grade of C-
- EGC442 Minimum Grade of C-
- EGC445 Minimum Grade of C-
- EGC446 Minimum Grade of C-

May not be repeated for credit

**EGC493. Comp Eng Select Topics. 3-12 Credits.**

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- EGC220 Minimum Grade of C-

May be repeated for credit

**EGC494. Fieldwork Computer Engin. 0 Credits.****Restrictions:**

- Must not be enrolled in the following class: Freshman

May not be repeated for credit

**EGC495. Indep Study Comptr Engin. 1-12 Credits.****Restrictions:**

- Must not be enrolled in the following class: Freshman

May be repeated for credit