Undergraduate Handbook

Department of Computer Engineering

Philadelphia University
Amman – Jordan

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Table of Contents

Contact Information

Department of Computer Engineering
Philadelphia University
P.O.Box: 1
Amman, 19392
Jordan
Tel: ++ 962 4799000x 2213

Important websites

Admission and Registration information

http://www.philadelphia.edu.jo/university/index.php?option=com_content&task=view&id=318&Itemid=444

http://www.philadelphia.edu.jo/arabic/admission.asp

Department of Computer Engineering

http://www.philadelphia.edu.jo/university/index.php?option=com_content&task=view&id=170&Itemid=182

Deanship of Student affairs

http://www.philadelphia.edu.jo/university/index.php?option=com_content&task=view&id=134&Itemid=144

Introduction

History

Philadelphia University was established in 1989 as a private, accredited university in Jordan. The faculty of Engineering was established in 1991, and has graduated more than 450 engineers, who are working inside Jordan and abroad. The faculty of Engineering comprises the following departments:

- Computer Engineering
- Electrical Engineering
- Mechanical Engineering
- Communications and Electronics Engineering
- Mechatronics Engineering
- Architectural Engineering
- Civil Engineering

The faculty of Engineering is housed in several buildings with a total area of 5400m^2, and has 35 specialized and highly equipped laboratories. The total number of engineering students is more than 1600 students.

Mission Statement

As a distinguished academic institution, Philadelphia University commits itself to becoming a full partner in the development of both Jordanian society and other societies at the regional and global levels. The role of science, technology, information and means of communication is becoming absolutely vital to the well-being of humanity. In the coming few years, this role is bound to become a decisive engine of growth. High-quality relevant education, supported by problem-oriented, inter-disciplinary and inter-institutional research, is the only means of leading any society to become an active and productive partner in human civilization.

The speed of globalization and the collapse of cultural and economic barriers require modern education, e-learning and interactive systems to be rooted in democratic interaction, human rights, complete freedom of thought and greater creativity by the younger sectors of society.

As the rapid development of knowledge, science and technology could widen the cultural divide between generations and society, modern approaches to education and lifelong interactive learning will be indispensable in alleviating the effects of this trend.

Carrying a revered name, with deep roots in history, of a major city of the Despoils on the King Road linking old civilizations, Philadelphia University is committed to moving forward, through the twin engines of quality and

modernity, along the information highway. It hopes to make a strong bond between knowledge, learning and modern civilization.

The keynote here is proper, fast-developing and morally charged education. Young men and women are the vehicle that launches societies into a future propelled by quality education to prosperity and innovation. Philadelphia University and its sister institutions will be instrumental in bringing this about.

Computer Engineering Department

Overview

The Computer Engineering Department at Philadelphia University has 100 students, which accounts for 6.5% of the total engineering students in the Faculty of Engineering. The department has 5 faculty members with unique experience in various areas of computer engineering, who graduated from globally ranked foreign institutions. The faculty to student ratio in the department is about 1:25, which will provide the students with more time to share with their respective faculty members to enhance the quality of learning. The department has 9 laboratories that are dedicated to exposing students to the latest technologies in the subjects taught. Each laboratory is supervised by a faculty member, and is run by an experienced engineer.

Mission

The Computer Engineering Department has put forward several goals and missions to enhance the quality of its graduates so that they would have difficulties dealing with the real world after their graduation. Its mission is to:

- Introduce the theoretical and practical aspects of computer engineering field.
- Enhance student ability to analyze and design both computer hardware and software systems.
- Teach students real-time and real world computer applications such as interfacing, control, monitoring, computer networks and software engineering.
- Enhance and motivate creative thinking and innovation.
- Expose students to the engineering ethics, and have them embrace such practices in real life.
- Implant the spirit of competition and lifelong process of learning in our students.
- Teach students how to lead in their own and global communities and to confront the challenges of the computers era without fear.

Facilities

Department Laboratories

The following laboratories are the corner stone of the department where students get exposed to the latest equipments used in the design, implementation and troubleshooting of modern digital and computer related hardware and software components in the industry.

Software (1) Laboratory (630222)

The experiments given in this laboratory are designed to improve the student skills in C & C++ programming languages as well as object oriented programming (OOP) methodology. The laboratory can serve 20 students, each on his/her own machine that is loaded with Microsoft Visual Studio Suite.

Software (2) Laboratory (630321)

This laboratory covers the concepts of object oriented programming (OOP) and data structures (DS) that will aid the students in solving multidisciplinary domain problems in engineering. Algorithm design is highly emphasized. A machine for each student is also provided to provide hands on experience.

Software (3) Laboratory (630420)

The laboratory is set for small project assignments that will expose the student the latest in technology and software usage. The students will get exposed to the design of various data bases through the use of the SQL language through the Oracle development environment and forms. Also, the students will use the internationally used software development suite from Rational Inc. for testing, verification and documentation purposes.

Logic Circuits Laboratory (630212)

This laboratory focuses on teaching the students the design and implementation of combinational and sequential logic circuits that are needed in almost all aspects and appliances of our daily lives. The students are taught how to design, implement and debug their simple logic designs to perform control logic functions. Logic circuit training kits as well as measurement instrumentation are used to aid the student in understanding the subject.

Microprocessors Laboratory (630313)

The laboratory focuses on helping the student understand the low level machine language and instruction sets of microprocessors. Writing in assembly language is used to design and implement simple experiments. The student will learn how to use Microsoft Assembler (MASM) language and debugging tools as well as special kits that will allow the student test the results of his machine language programs.

Computer Networks Laboratory (630412)

In the age of information technology and data transfer, it is vital that fresh graduate have hands on experience with current data networks. The Networks laboratory at the Computer Engineering Department at Philadelphia University is fully equipped with the latest instruments that expose our students to actual understanding of data network functionality, configuration and deployment. The students are exposed to network subnetting, HUB and Router installations and configuration, computer setups as well as cabling schemes.

Computer Design Laboratory (630430)

The Computer Engineering Department at Philadelphia University is proud to claim that it was the first university in JORDAN to have established a programmable logic laboratory for the design and implementation of embedded systems using field programmable logic arrays (FPGAs) and complex programmable logic devices (CPLDs) in its curricula and senior project designs. The boards used in this laboratory are the well known boards from Xilinx Inc. in the USA, and the students are exposed to this new technology and use it in their senior project designs. The students are taught VHDL and Verilog hardware description languages for the purpose of building embedded systems.

Two Open Laboratories

Students can access free internet services

Technology Incubators

"*Economic and social development cannot be achieved in the absence of initiative and creativity, or in the presence of fear of change*"

His Majesty King Abdullah II

The Jordan Innovation Center (JIC) at Philadelphia University is a new type of Business Incubators to be launched in Jordan to provide support and development of new innovative technical and business ideas. It supports innovative projects in any discipline provided that it has a potential for commercial use.

A Business Incubator provides "a unique and highly flexible combination of business development processes, infrastructure and people, designed to nurture and grow new and small businesses by supporting them through the early stages of development and change." (UKBI)

Business Incubators are a powerful economic development tool used extensively in Europe and the USA with around 4000 in existence worldwide today. The JIC at Philadelphia University intends to replicate this success within the Jordanian economy.

The Computer Engineering Department at Philadelphia University has direct interactions with the Business Incubator at the university, where several senior project designs from the department have been supported and funded by the JIC.

Faculty Members

The Computer Engineering Department includes the following full time faculty members:

- **Dr. Amir Abu Ali, Ph.D** (Associate Professor)
  Specialty: Data base and Computer networks
  Tel: 4799000 x 2514

- **Dr. Mohammed Mehdi Selman, Ph.D** (Assistant Professor)
  Specialty: Real-time computer control, intelligent control, Neural Networks.
  Tel: 4799000 x 2128
  Email: m_selman@philadelphia.edu.jo

- **Dr. Qadri Hamarsheh, Ph.D** (Assistant Professor)
  Specialty: Digital Signal Processing, Programming languages, Computer Networks.
  Tel: 4799000 x 2492
  Email: qhamarsheh@philadelphia.edu.jo

- **Dr. Ali Al-Khawaldah, Ph.D** (Assistant Professor)
  Specialty: Programming languages, Software design, Network Architecture.
  Tel: 4799000 x 2599
  Email: akhwaldeh@philadelphia.edu.jo

- **Eng. Anis Al-Nazer, MSc.** (Lecturer)
  Specialty: VLSI design and testing, Digital electronics.
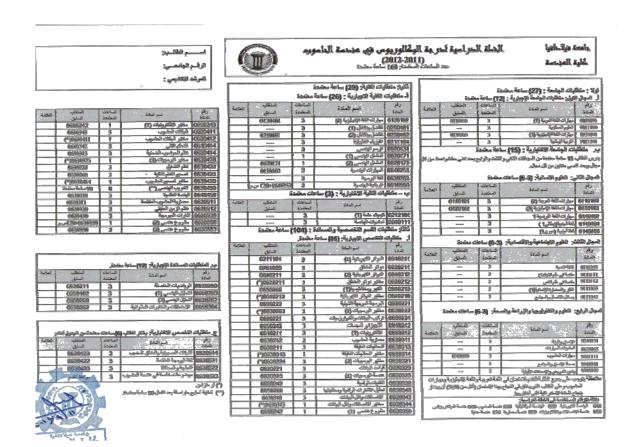 **Tel**: 02 637444 x 2149
  Email: anazer@philadelphia.edu.jo

Computer Engineering Curricula

Overview

Computer Engineering is one of the highly progressing disciplines that need to be up to date with state of the art technology. The courses offered by the Computer Engineering Department at Philadelphia University follow the highest standards and the outlines and text books used by top foreign universities. Our faculty members have a broad experience in all aspects of Computer Engineering, from hardware design, to microprocessor programming, to software development to embedded systems design and implementation.

The Computer Engineering curricula at Philadelphia University consist of 160 credit hours (CHs). Out of the 160 CHs, there are 27 CHs that are university requirements, 29 CHs (26 that are faculty compulsory requirements plus 3 CHs faculty optional requirements), and 104 CHs that are department requirements. Each is divided into sub-requirements as shown in the tables that follow. Grades at Philadelphia University are given in percentages (out of 100). A student is supposed to pass the courses with an accumulative grade point average of **60%** to graduate. A detailed grade description can be found at the admissions office website.

Computer Engineering Curricula 2012-2013

Course Description

(250101) Engineering Mathematics I
General Introduction. Differentiation. Mean value theorem. Integration-the fundamental theorem and applications. Techniques of integration. Sequences. Infinite and power series. Conic section. Polar coordinators. Vector functions. Differentiation. Curves. Arc length. Applications in mechanics.

(250102) Engineering Mathematics II
Infinite and power series, Conic Sections, Polar Coordinates, Vector functions, Arc-Length, Applications in mechanics, Functions of several variables, Partial differentiation, The Gradient, Directional derivatives, Tangent lines, Tangent planes, The Normal line, Maxima and minima, The Second partial test, Lagrange method, Multiple integrals (double and triple). Line and surface integrals, Theorems of Green, Gauss and Stokes.

11

(650260) Engineering Analysis I

Differential equations & mathematical modeling. First order differential equations. Linear second & high order differential equations. Modeling of Electrical and mechanical systems. Laplace Transform. Series solution of differential equations. Initial value problem. Simple nonlinear Differential equations. Partial differential equations & boundary value problem.

(630262) Engineering Analysis II

Matrices, Determinants, Solution of Linear and nonlinear equations. Direct and iterative solutions. Interpolation and curve fitting. Numerical integration and differentiation. Numerical Solution of differential equations. Fourier series and Fourier Transform.

(630263) Programming Language

C and C++ Programming Environment: Compiled language, program creation, structure of programs, Problem solving techniques, Elements of C++ programming language, Operands of C++, Expressions, Program design process, Control structures, Looping, Functions, C++ stream input/output, Structured types, Data abstraction and classes, Arrays, Pointers, dynamic data and reference types, File processing, Templates.

(630260) Discrete Mathematics

Numbers & operations. Set theory. Data types: an introduction to algebraic specification. Functions & their manipulation. Structures: sequences, graphs, trees. Propositional logic, Predicate logic, Binary relationships.

(630221) Object Oriented Programming

Introduction to OOP: structures, classes. Dynamic memory management: pointers, arrays, structures. Classes & Abstracted Data Types. Class Operators & Templates. Inheritance: Base classes & derived classes, protected members, templates & inheritance.

(630222) Software Laboratory (1)

The experiments given in this lab. will improve the student skills in C & C++ programming.

(630224) Data Structures and Algorithms

Data types: records, files, and sets. Dynamic data structures. Single, double, and circular linked. Lists and queues. Stacks, and binary trees. Shell sort, quick sort, binary search, and hashing. Data compression. Definitions of algorithms. Design & analysis of algorithms: Divide and conquer, Greedy algorithm. Dynamics programming. Backtracking. Branch and bound technique. NP-hard and NP-complete problems.

(630211) Logic Circuits

Number Systems: Binary, Octal, Decimal, and Hexadecimal. Boolean Variables and Algebra. Minimization of Boolean Functions. Combinational Circuits With MSI Components. Sequential Circuits Analysis and Design. MSI Counters and Registers. Memories. Introduction to Computers.

(630212) Logic Circuits Lab.

Basic Logic Circuits (Familiarization with AND, OR, NOT, NOR, and NAND gates). De Morgan's Theorems. Combinational Circuits. MSI Components. RS, JK, D, and T Flip-Flops. Sequential Circuits. Registers and Counters.

(630323) Data Base

Introduction to data bases. Data base system architecture. Introduction to relational data-bases. Introduction to SQL. The relational model. Domains and relations. Data base algebra. Relational calculus. Data base design and applications.

(630321) Software Laboratory (2)

This lab. covers the main concepts of data structures: Arrays , Records, Stacks, Queues and Lists Sorting and merging. Searching techniques. The principles of algorithms: Analysis, design, dynamic programming. Back tracking. Branch techniques. Also, tutorials to cover database systems.

(630325) Software Engineering I

Basic concepts: S/W engineering tools and methodologies. Requirements engineering: S/W document, validation & evolution. Requirements Analysis: Viewpoint – oriented, method-based. System contexts. Systems methods: Data Flow, semantic. Object Requirements definition & specifications. Software prototyping. Formal specification. Development Process. Development for Reliability: Fault avoidance, Fault tolerance, Exception handling. Defensive programming.

(630311) Computer Architecture

Basic computer architecture and organization. Instruction set and addressing modes. Processor design. The execution unit and the control unit. Microprogramming memory hierarchy and organization. Input/output systems. Introduction to parallel processing.

(630313) Microprocessors

Introduction to microprocessor architecture. Addressing modes. Data movement instruction. Arithmetic & Logic instructions. Program control instructions. Microprocessor programming. Introduction to microprocessor interfacing.

(630314) Microprocessors Laboratory

Familiarization with the microprocessor lab. Microprocessor instruction set and assembly language fundamentals. Writing, debugging, and executing various assembly language programs. Memory (RAM) interfacing. I/O interfacing.

(630423) Intelligent Systems Design

Introduction. Knowledge representation and acquisition. The inference engine. Enhancements. Validation. Hybrid expert systems. Implementation of intelligent systems. Applications. and code generation.

(630420) Software Laboratory (3)

Selected tutorials (as small projects) to cover the principles of software engineering: Analysis, design, verification, testing, software documentation and management.

(630422) Operating Systems

Importance, definition, and functions of an operating system. I/O programming. Interrupt structure and processing . Memory management: Partitioned, relocatable, paged, demand paged, segmented, segmented-and-paged. Processor management. Job and process scheduling. Process synchronization. Device management. Virtual devices. Information management.

(630411) Computer Networks

Data Communications and ISO model . Open system standard. Circuit switching and packet switching . The physical layer: functions, handshake concepts, bandwidth. Data link layer: transparency, framing, error detection, protocols. Network layer: circuit switching, message switching, packet switching and virtual circuits. Transport layer: TCP/IP protocol, IP addressing. LAN topologies and types. The Ethernet. Bridges and repeaters. Routers and Switches. Introduction to WAN and internet.

(630412) Computer Networks Laboratory

Several tutorials to cover the principles of operating systems and analysis tutorials to cover the design and implementation of computer networks.

(630414) Embedded Systems

It includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications. Learning the concepts will be enforced by a Project to design and develop an embedded system based on a single-chip microcontroller.

(630430) Computer Design Laboratory

Design and implementation of a single board microprocessor-based system comprising a CPU, PIA, VART, RAM, EPROM and PTM (Programmable Time) from a specific family such as MC 6809 using wire-wrapping technique; some basic experiments are done using this board such as its interfacing printer using PTM for frequency and time measurements. Square-wave generator.

(630521) Advanced Programming Language

This course will cover the features and applications of an advanced programming language, such as C# and JAVA. The course description will be decided by the department.

(630514) Neural Networks & Fuzzy Logic

Neural versus conventional computing. Learning processes. The preceptor. The backpropagation learning algorithm. Recurrent networks. Self-organization Feature maps. Applications. Introduction to Fuzzy theory. Fuzzy Logic. Fuzzy logic in engineering.

(630511) Advanced Computer Architecture

An Advanced treatment of computer architecture covering new technological developments. Including detail to multiprocessor systems and specialized machines. Special emphasis will be developed to new concepts such as data flow machines. higher level language processors and associative processor.

(630522) Modeling & Simulation

Introduction: Physical model. Symbolic model. Mental model. Modeling methodology: analysis, formulations, solution strategy, verification. Validation and certification. Discrete simulation. Continues simulation. Event activity and processes. Monte Carlo Simulation. Process oriented approach. Random number and random variables. Simulation Language.

(630512) Real-Time Systems

Introduction to Real-time systems. Time handling. Objects. Real-time applications. Real-time system lifecycle. Structured design approaches. Petri Net models. Language support and restriction . Verification & validation of real-time software. Real-time operating systems. Allocation & scheduling. Applications.

(630550) Engineering Project II

The student should attach himself to one or more faculty members who assign him a project. He analyzes this project and suggests a method to carry out the project in the next stage.

(630553) Engineering Project III

Based on the results obtained from the first stage. The student carries out the project suggested by the department.

Student Advising

The definition of academic advising is based on the interaction between the engineering student and his/her advisor until the required courses within his/her curricula is taken.

The student has to know the following:

- Each student in the Faculty of Engineering is assigned an academic advisor by the department. The advisor is responsible for advising what courses are chosen for registration. This should be performed at the beginning of every semester.

- The student has to take the following points into consideration regarding the registration process:

    o Making sure that he/she passed the relevant prerequisite courses (refer to Computer Engineering Curricula)
    o Following the sequence of registration steps shown in the study plan, which are as follows:
        ▪ University requirements: compulsory courses and electives.
        ▪ Faculty requirements: compulsory and electives.
        ▪ Specialty requirements.
    o Consulting the study plan during the registration process in respect of the number of credit hours a student can take per semester.
    o As the academic advising process is not compulsory, the student can register for classes without taking the advisor's comments into consideration, but he/she will take full responsibility for this action and its consequences since this might delay his/her graduation.

- The student must understand that he/she has to register for a minimum of 12 credit hours and a maximum of 18 in regular semesters.

- The student has the right to withdraw (drop) from a course or more during a certain semester provided that he/she remains registered for at least 9 credit hours. This withdrawal (drop) must be approved by the course professor and the academic advisor.
  The withdrawal (drop) should take place during a specific period of time that is set by the Admission and Registration Department. There is a specific period within which the student can get a refund for the course fees, after this period the student will lose his/her right to get the refund.

- The student can add/drop courses only in accordance with the admission and registration office time table. The student is allowed to add/drop a limited number of courses as per the regulations set by the Admissions and Registration Department.

Quality Assurance

Philadelphia University was ranked the first leading all public and private universities in Jordan in the quality assurance measures set by of the Hussein Fund for Creativity and Excellence for the Faculties of Information Technology and Law. The university has set and demonstrated the highest quality assurance measures in teaching, management and research development that attracted the attention of domestic and foreign institutions.

In the Computer Engineering Department, the highest measures of quality assurance are being adopted to raise the level of teaching standards, and implement clear measures for teaching, advising, senior project organization, testing and course assessment. This is put in a feedback system that helps the department hear the comments from the students and allow them to evaluate both courses and instructors. This of course increases the level and quality of teaching as well as information delivery.

Both, the mission of the department and its objectives stress on the implementation of the highest quality measures and regulations to provide the best learning experience to our students. (*See department mission in the Computer Engineering Department mission section*)

Honors and Awards

Philadelphia University and the Computer Engineering Department promote and encourage students to excel in their studies through the introduction of various awards and honor lists that reflect the hard work of our students and encourage them to keep it up.

These awards are listed on the University Admission site (http://www.philadelphia.edu.jo/admission.asp). Also, an annual honor list is published and engraved on the entrance of the Faculty of Engineering that highlights the names of the honor students from each engineering discipline.