



## Computer Engineering and Software Systems Program (CESS)

### 1. Program mission

*“The CESS program mission is to provide high quality education in the field of computer engineering and software systems to contribute to the preparation of a distinguished graduate capable of staying up-to-date with the global technological development in the field of computer engineering and software systems, capable of meeting the needs of the local, regional and international market, and able to conduct scientific and applied research. The program’s mission is realized through the continuous development of the program.”*

The systematic development of high-quality software systems that are concerned with quality, cost, time, and a number of other requirements, demands well-qualified engineers in this field. Software engineering is one of the most promising fields in engineering and is considered an important milestone in the ever-growing information technology sector. Therefore, the main objective of this program is to graduate highly qualified engineers in the fields of computer engineering and software industry. This program focuses on modern methodologies in software industry that represents an important sector of the national economy. In this program, students study a variety of courses that complement each other to produce a world-class qualified engineer. The program provides the students with the engineering knowledge and principles that are applied in each phase of the software development life-cycle including requirements analysis, design, validation, implementation, testing, documentation, and management. The program is therefore based on the following intentions:

- PM1.** To equip students with the required basic knowledge of engineering sciences to produce solutions that meet specified needs with consideration of public health, and welfare, as well as global, cultural, social, environmental, and economic factors.
- PM2.** To prepare students to be innovative in the design, research, and implementation of software products with strong problem solving, communication, teamwork, leadership, and entrepreneurial skills
- PM3.** To enable students to establish technical leadership in the software engineering and development areas.

### 2. Program aims

By successfully completing the Computer Engineering and Software Systems program at the Faculty of Engineering, Ain Shams University, the graduate will be able to:

- PA 1.** Apply knowledge of mathematics, science and engineering concepts to the solution of computer and software engineering problems.
- PA 2.** Identify, formulate, and solve fundamental engineering problems.
- PA 3.** Use the techniques, skills, and engineering tools, necessary for engineering practice and project management.
- PA 4.** Demonstrate knowledge of contemporary engineering issues.
- PA 5.** Design computer/software systems; components and processes to meet the requirements specifications within realistic constraints.
- PA 6.** Design and conduct analysis process and experiments as well as analyze and interpret data.
- PA 7.** Use current techniques, skills, and tools necessary for computing practices to specify, analyze, design, implement, verify, validate, and evolve computer- and software- based systems.
- PA 8.** Recognize the information requirements of various business activities on both operational and decision-making levels.
- PA 9.** Tackle business problems using system analysis tools and techniques.
- PA 10.** Manage projects related to computer and software engineering in diverse fields of applications.
- PA 11.** Implement the different phases of the computer and software systems development life-cycle, procurement and installation of hardware, software analysis, design, validation, verification, and maintenance, data manipulation and system operations.



- PA 12.** Work effectively within multi-disciplinary teams.
- PA 13.** Communicate effectively.
- PA 14.** Consider the impacts of engineering solutions on society and environment.
- PA 15.** Display professional, ethical responsibilities and contextual understanding.
- PA 16.** Engage in self- and life- long learning.
- PA 17.** Demonstrate inductive reasoning abilities, figure out general rules and conclusions about seemingly unrelated events.

### **3. Graduate attributes**

To achieve the program mission and aims, program graduates should be able to:

- GA 1-** Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.
- GA 2-** Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.
- GA 3-** Behave professionally and adhere to engineering ethics and standards.
- GA 4-** Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
- GA 5-** Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community.
- GA 6-** Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
- GA 7-** Use techniques, skills and modern engineering tools necessary for engineering practice.
- GA 8-** Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.
- GA 9-** Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
- GA 10-** Demonstrate leadership qualities, business administration and entrepreneurial skills.
- GA 11-** Design and implement elements, modules, sub-systems, or systems using technological and professional tools.
- GA 12-** Select and analyse appropriate design techniques for computer engineering and software systems.
- GA 13-** Estimate and measure the performance of a digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
- GA 14-** Identify needs, plan and manage resources, and gather information for solving a specific digital problem and document and communicate this solution efficiently.
- GA 15-** Carry out design, development, testing, debugging, operation, and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.
- GA 16-** Establish an environment to build, test and release digital systems in a more rapid, frequent, and reliable manner by emphasizing the collaboration and communication of developers and operations team members.



**GA 17-** Select the most suitable technologies to deploy solutions to various kinds of problems and develop solutions using them.

**GA 18-** Abide to software engineering standards and best practices.

**GA 19-** Demonstrate additional abilities related to the field of the concentration within Computer Engineering and Software Systems.

#### 4. Program Career Prospects

The graduate of this program will establish technical leadership in the area of computer engineering and software systems. In addition to his contributions as a professional engineer who is able to participate and cooperate productively in his respective fields. The skills of the graduates of this program that include computer engineering, software engineering, distributed and mobile computing, embedded systems, computer security, multimedia systems, data science, and others, will lead to high-level positions in leading the engineering projects in these areas. Therefore, this program will meet the increasing demand for this specialization to meet the market needs at the national, regional, and international levels.

The program qualifies graduates to work as computer and software engineers. The graduate can be specialized in one of the following four concentrations (fields):

- 1. Multimedia and Computer Graphics:** This concentration prepares the graduate to work in the field of graphics software development including image processing, vision, computer animation, and games development.
- 2. Distributed and Mobile Computing:** This concentration prepares the graduate to work in the field of distributed systems and networking including cloud computing, wireless and mobile networks, digital forensics, IOT, and parallel computing.
- 3. Software Product Lines:** This concentration prepares the graduate to work as a full-fledged software engineer who deeply understands all software development processes and aspects including financial, managerial, and design, security, and performance aspects.
- 4. Data Science:** This concentration prepares the graduate to work as a data scientist by covering a wide range of topics including big-data, machine learning, deep learning, and various application such as bioinformatics and business intelligence.

#### 5. Agreements with another University

The program is in partnership with the University of East London (UEL), one of the leading modern Universities in the United Kingdom for Engineering and Computing. The Graduates are eligible for the B.Sc. Computer Engineering and Software Systems dual award from Ain Shams University and the University of East London. Both institutions work together to ensure the quality and standards of the program on which the students are registered. Students are allowed to study one semester or more at UEL with a 10% reduction in the UK tuition fees.

#### 6. Program admission requirements

- Students with Egyptian Secondary education or equivalent certificate with major in Mathematics and/or equivalent diplomas may apply for admission/enrolment in the Credit Hours Engineering Programs after being accepted in the Faculty of Engineering (ASU) based on the rules yearly set by the Higher Council of Universities.
- The official teaching Language is English, and the Faculty of Engineering will ascertain the student's English Language proficiency. Textbooks, assignments, and examinations are all in English.

## 7. Curriculum Structure and Contents

### 7.1 Program structure

- i- Total number of courses (NCs): 62
- ii- No. of credit hours (CHs): 170
- iii- European Credit Transfer System (ECTS): 300
- iv- Student Workload (SWL): 7500
- v- Requirements (%):

1	University Requirement	UR	8 %
2	Faculty Requirement	FR	25 %
3	Discipline Requirement	DR	67 %

- vi- Practical/Field Training: The student must perform field training for 12 weeks in industrial or service facilities.

### 7.2 Program Study Levels

The following table shows the student status and the study levels depending on the number of credit hours that the student completed. Whenever the student has completed 20% of the graduation requirements, he will be transferred from one level to a higher level (0-4).

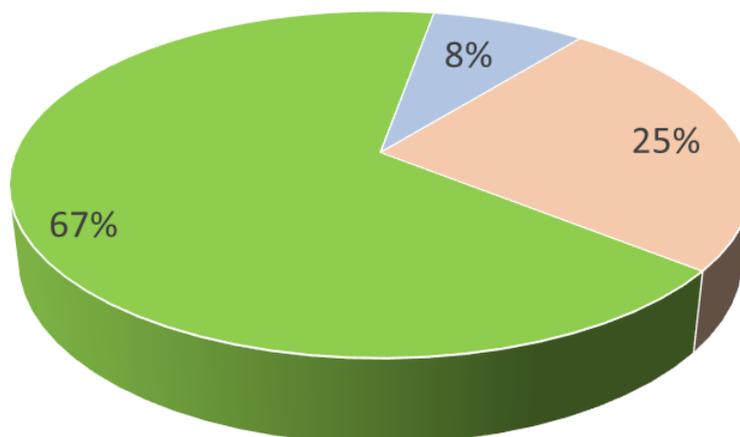
*Study Levels and relation to the achieved Credit Hours.*

Study Level	Student Status	Achieved Credit Hours
0	Freshman	0 CH to less than 34 CH
1	Sophomore	35 CH to less than 68 CH
2	Junior	69 CH to less than 102 CH
3	Senior-1	103 CH to less than 136 CH
4	Senior-2	137 CH to less than 170 CH

### 7.3 Program Courses

The courses in the program study plan are categorized into the following three groups

■ University Requirements   
 ■ Faculty Requirements   
 ■ Specialization Requirements   
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## University Requirements

To achieve this goal, Ain Shams University has designed a number of courses planned to build the student personality, develop his skills, and increase his awareness of different topics. These courses are called University Requirements. The Faculty of Engineering Ain Shams University has selected some of these courses to be offered within the Engineering Programs. These courses are:

*List of University requirements courses.*

Code	Course Title	Credits and SWL			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
ASU011	Technical English Language	0	4	100	2	2	0	4
ASU111	Human Rights	2	2	50	2	1	0	3
ASU112	Report Writing and Communication skills	3	4	100	2	2	0	4
ASU113	Professional Ethics and Legislations	3	4	100	2	2	0	4
ASU114	Selected Topics in Contemporary Issues	2	2	50	2	0	0	2
-	ASU Elective (1)	2	3	75	2	1	0	3
-	ASU Elective (2)	2	2	50	2	0	0	2
Total		14	17	425	12	6	0	18
Pool of ASU Elective (1) Courses								
ASU321	Innovation and Entrepreneurship	2	3	75	2	1	0	3
ASU322	Language Course – can accept equivalent certificates	2	3	75	2	1	0	3
ASU323	Introduction to Accounting	2	3	75	2	1	0	3
ASU324	History of Engineering and Technology	2	3	75	2	1	0	3
Pool of ASU Elective (2) Courses								
ASU331	Human Resources Management	2	2	50	2	0	0	2
ASU332	History of Architecture	2	2	50	2	0	0	2
ASU333	Introduction to Marketing	2	2	50	2	0	0	2
ASU334	Building Safety and Fire Protection	2	2	50	2	0	0	2
ASU335	Literature and Arts	2	2	50	2	0	0	2
ASU336	Business Administration	2	2	50	2	0	0	2

A placement test in English Language will be conducted for some admitted students to the Faculty of Engineering. If the student passes this test, then he will be exempted from taking the Technical English Language Course. The Technical English Language course is a pre-requisite for all Faculty requirements courses.

For ASU322 – Language course, any non-English language is accepted including Arabic. If a student has an equivalent certificate, he is exempted from taking this course.

### I. Faculty Requirements

A set of courses must be completed as a Faculty Requirement. These courses are divided into Basic Science Courses and Basic Engineering Courses.

*List of Faculty requirements courses.*

Code	Course Title	Credits and SWL			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
PHM011	Basic Mathematics	0	4	100	2	2	0	4
ENG111	Field Training	0	12	300	0	10	15	25
PHM012	Mathematics (1)	3	5	125	3	2	0	5
PHM013	Mathematics (2)	3	5	125	3	2	0	5
PHM021	Vibration and Waves	3	5	125	3	1	1	5
PHM022	Electricity and Magnetism	3	5	125	3	1	1	5
PHM031	Statics	3	5	125	2	2	1	5
PHM032	Dynamics	3	5	125	2	2	1	5



Code	Course Title	Credits and SWL			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
PHM041	Engineering Chemistry	3	5	125	2	1	2	5
PHM111	Probability and Statistics	2	4	100	2	2	0	4
MDP081	Production Engineering	3	5	125	2	0	3	5
MDP011	Engineering Drawing	3	6	150	1	3	2	6
CEP011	Projection and Engineering Graphics	3	6	150	1	3	2	6
CSE031	Computing in Engineering	2	4	100	2	0	0	2
ENG011	Fundamentals of Engineering	2	4	100	2	1	0	3
-	Structures and Properties of Materials Elective	2	4	100	2	1	1	4
-	Engineering Economy Elective	2	4	100	2	1	0	3
-	Project Management Elective	2	4	100	2	1	0	3
Total		42	76	1900	34	23	14	71

Pool of Structures and Properties of Materials Elective Courses								
MDP151	Structures and Properties of Materials	2	4	100	2	1	1	4
EPM211	Properties of Electrical Materials	2	4	100	2	1	1	4
CES151	Structures and Properties of Construction Materials	2	4	100	2	1	1	4
Pool of Engineering Economy Elective Courses								
MDP231	Engineering Economy	2	4	100	2	1	0	3
ARC471	Feasibility Studies	2	4	100	2	1	0	3
ARC463	Renewable Energy Systems and Economics	2	4	100	2	1	0	3
UPL271	Society and Housing Economics	2	4	100	2	1	0	3
UPL471	Urban Economics	2	4	100	2	1	0	3
EPM119	Engineering Economy and Investments	2	4	100	2	1	0	3
CEI261	Engineering Economics and Management	2	4	100	2	1	0	3
CES171	Engineering Economics and Finance	2	4	100	2	1	0	3
Pool of Project Management Elective Courses								
MDP232	Industrial Project Management	2	4	100	2	1	0	3
ARC371	Architecture Project Management	2	4	100	2	1	0	3
EPM411	Project Management for Electrical Engineering	2	4	100	2	1	0	3
CSE441	Software Project Management	2	4	100	2	1	0	3
CES271	Project Management Essentials in Construction	2	4	100	2	1	0	3

A placement test in Mathematics will be conducted for all admitted students except some High School Degrees which are determined by the Faculty Council. If the student passes this test, then he will be exempted from taking Basic Mathematics Course. The Basic Mathematics course is a pre-requisite for all Faculty requirements courses.

## II. Specialization requirements

In order to get a Bachelor of Science Degree in this program, and to satisfy the program competences, the following set of courses need to be completed.

*List of Computer Engineering and Software Systems Program Requirements courses.*

Code	Course Title	Credits and SWL			Contact Hours			
		CH	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	14	17	425	12	6	0	18
	Faculty of Engineering Requirements	42	76	1900	34	23	14	71
PHM113	Differential and Partial Differential Equations	3	5	125	3	2	0	5
PHM114	Numerical Analysis	3	5	125	2	2	0	4
PHM211	Discrete Mathematics	2	4	100	2	2	0	4



ECE251	Signals and Systems Fundamentals	4	6	150	3	2	0	5
EPM118	Electrical and Electronic Circuits	3	6	150	2	2	1	5
CSE111	Logic Design	3	5	125	3	1	1	5
CSE112	Computer Organization and Architecture	4	8	200	3	2	2	7
CSE131	Computer Programming	3	6	150	3	0	2	5
CSE211	Introduction to Embedded Systems	3	5	125	2	2	2	6
CSE231	Advanced Computer Programming	3	5	125	2	0	2	4
CSE232	Advanced Software Engineering	3	5	125	2	2	0	4
CSE233	Agile Software Engineering	2	5	125	1	0	4	5
CSE312	Electronic Design Automation	2	4	100	2	1	1	4
CSE331	Data Structures and Algorithms	3	5	125	2	2	1	5
CSE332	Design and Analysis of Algorithms	3	5	125	2	2	1	5
CSE333	Database Systems	3	5	125	2	1	1	4
CSE334	Software Engineering	3	5	125	2	2	0	4
CSE335	Operating Systems	3	5	125	2	2	0	4
CSE336	Software Design Patterns	2	5	125	2	1	1	4
CSE338	Software Testing, Validation, and Verification	3	7	175	2	2	1	5
CSE341	Internet Programming	3	5	125	2	1	2	5
CSE351	Computer Networks	3	5	125	2	2	0	4
CSE354	Distributed Computing	3	4	100	2	2	1	5
CSE371	Control Engineering	3	5	125	2	1	1	4
CSE411	Real-Time and Embedded Systems Design	3	5	125	2	1	1	4
CSE431	Mobile Programming	3	5	125	2	1	2	5
CSE432	Automata and Computability	3	5	125	2	2	0	4
CSE439	Design of Compilers	3	5	125	2	1	1	4
CSE451	Computer and Networks Security	3	5	125	2	1	1	4
CSE455	High-Performance Computing	2	5	125	2	2	0	4
CSE472	Artificial Intelligence	3	5	125	2	2	0	4
	Computer Engineering Level 3 Electives	6	15	375	6	3	3	12
	Computer Engineering Level 4 Electives	12	20	500	12	4	4	20
CSE491	Computer and Systems Engineering Graduation Project (1)	3	6	150	0	0	5	5
CSE492	Computer and Systems Engineering Graduation Project (2)	3	6	150	0	0	5	5
<b>Total</b>		<b>170</b>	<b>300</b>	<b>7500</b>	<b>130</b>	<b>82</b>	<b>60</b>	<b>272</b>

The student has to select seven technical elective courses for a total of (18) credit hours with at least five of these courses from one of the mentioned fields.

Pool of Multimedia and Computer Graphics Concentration Elective Courses								
CSE374	Digital Image Processing	2	5	125	2	1	1	4
CSE377	Pattern Recognition	2	5	125	2	1	1	4
CSE378	Computer Graphics	2	5	125	2	1	1	4
CSE379	Human-Computer Interaction	2	5	125	2	1	1	4
CSE474	Visualization	3	5	125	3	1	1	5
CSE479	Multimedia Engineering	3	5	125	3	1	1	5
CSE481	Computer Animation	3	5	125	3	1	1	5
CSE482	Game Design and Development	3	5	125	3	1	1	5
CSE483	Computer Vision	3	5	125	3	1	1	5
CSE487	Selected Topics in Multimedia and Computer Graphics	3	5	125	3	1	1	5
Pool of Distributed and Mobile Computing Concentration Elective Courses								



CSE314	Parallel and Cluster Computing	2	5	125	2	1	1	4
CSE355	Parallel and Distributed Algorithms	2	5	125	2	1	1	4
CSE356	Internet of Things	2	5	125	2	1	1	4
CSE357	Networks Operation and Management	2	5	125	2	1	1	4
CSE412	Embedded Operating Systems	3	5	125	3	1	1	5
CSE456	Cloud Computing	3	5	125	3	1	1	5
CSE457	Mobile and Wireless Networks	3	5	125	3	1	1	5
CSE458	Computer and Network Forensics	3	5	125	3	1	1	5
CSE461	Selected Topics in Distributed and Mobile Computing	3	5	125	3	1	1	5
<b>Pool of Software Product Lines Concentration Elective Courses</b>								
CSE339	Software Formal Specifications	2	5	125	2	1	1	4
CSE342	Program Analysis	2	5	125	2	1	1	4
CSE343	Software Engineering Process Management	2	5	125	2	1	1	4
CSE344	Dependability and Reliability of Software Systems	2	5	125	2	1	1	4
CSE345	Business Process Modelling	2	5	125	2	1	1	4
CSE433	Software Performance Evaluation	3	5	125	3	1	1	5
CSE434	Aspect- and Service-Oriented Software Systems	3	5	125	3	1	1	5
CSE435	Secure Code Development	3	5	125	3	1	1	5
CSE436	Software Quality Assurance	3	5	125	3	1	1	5
CSE438	Selected Topics in Software Product Lines	3	5	125	3	1	1	5
<b>Pool of Data Science Concentration Elective Courses</b>								
CSE346	Advanced Database Systems	2	5	125	2	1	1	4
CSE381	Introduction to Machine Learning	2	5	125	2	1	1	4
CSE382	Data Mining and Business Intelligence	2	5	125	2	1	1	4
CSE484	Big-Data Analytics	3	5	125	3	1	1	5
CSE485	Deep Learning	3	5	125	3	1	1	5
CSE486	Bioinformatics	3	5	125	3	1	1	5
CSE488	Ontologies and the Semantic Web	3	5	125	3	1	1	5
CSE489	Selected Topics in Data Science	3	5	125	3	1	1	5

## 7.4 Proposed Study Plan

Code	Course Title	Credits and SWL			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
<b>Semester 1</b>									
PHM012	Mathematics (1)	3	5	125	3	2	0	5	Eng/Math
PHM021	Vibration and Waves	3	5	125	3	1	1	5	Eng/Math
PHM031	Statics	3	5	125	2	2	1	5	Eng/Math
MDP011	Engineering Drawing	3	6	150	1	3	2	6	
PHM041	Engineering Chemistry	3	5	125	2	1	2	5	Eng
CSE031	Computing in Engineering	2	4	100	2	0	0	2	
Total		17	30	750	13	9	6	28	
<b>Semester 2</b>									
PHM013	Mathematics (2)	3	5	125	3	2	0	5	PHM012
PHM022	Electricity and Magnetism	3	5	125	3	1	1	5	Eng/Math
PHM032	Dynamics	3	5	125	2	2	1	5	PHM031
CEP011	Projection and Engineering Graphics	3	6	150	1	3	2	6	
MDP081	Production Engineering	3	5	125	2	0	3	5	Eng
ENG011	Fundamentals of Engineering	2	4	100	2	1	0	3	
Total		17	30	750	13	9	7	29	
<b>Semester 3</b>									

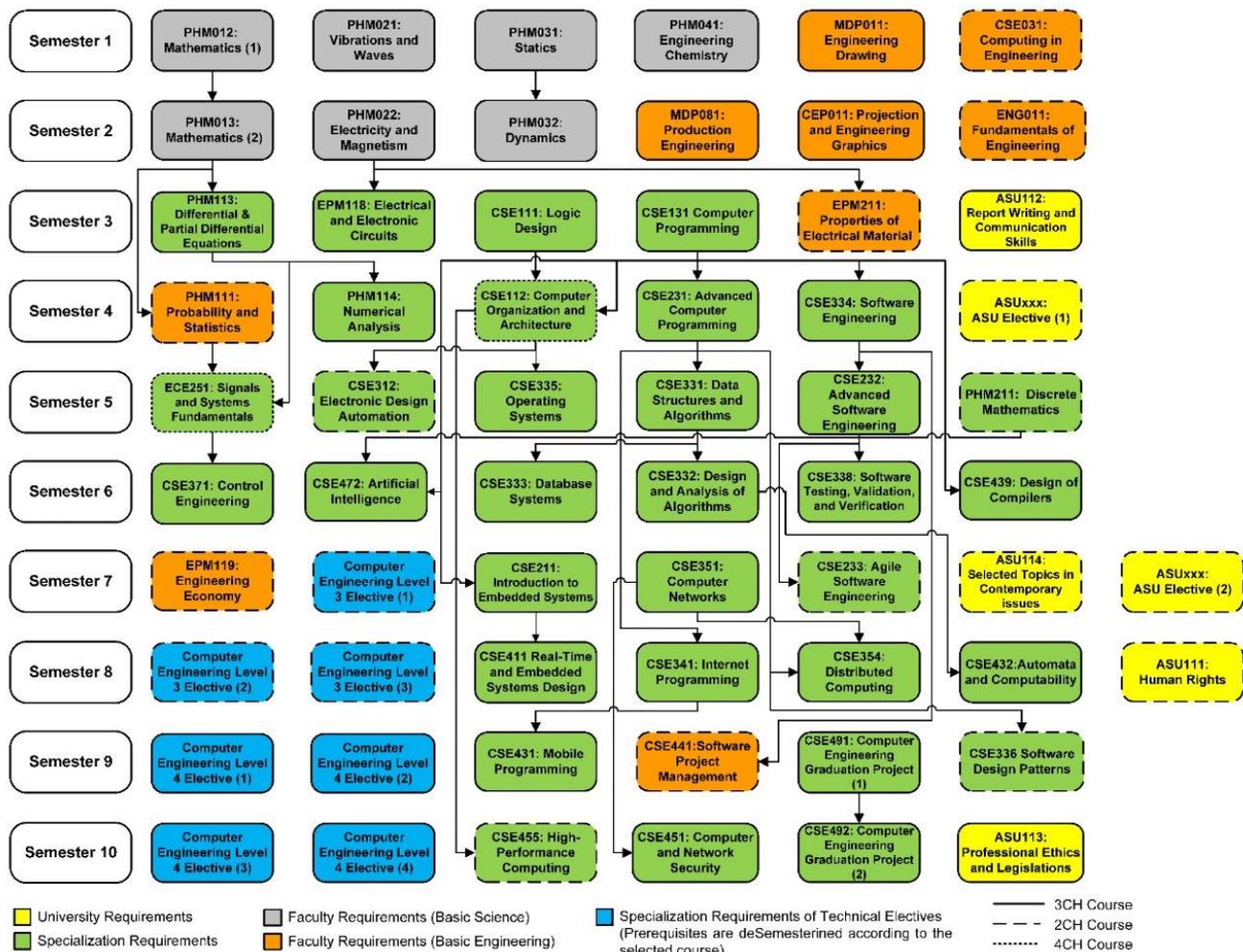


CSE111	Logic Design	3	5	125	3	1	1	5	
CSE131	Computer Programming	3	6	150	3	0	2	5	
PHM113	Differential and Partial Differential Equations	3	5	125	3	2	0	5	PHM013
EPM118	Electrical and Electronic Circuits	3	6	150	2	2	1	5	PHM022
EPM211	Properties of Electrical Materials	2	4	100	2	1	1	4	PHM022
ASU112	Report Writing and Communication skills	3	4	100	2	2	0	4	
Total		17	30	750	15	8	5	28	
<b>Semester 4</b>									
CSE112	Computer Organization and Architecture	4	8	200	3	2	2	7	CSE111 CSE131
CSE231	Advanced Computer Programming	3	5	125	2	0	2	4	CSE131
CSE334	Software Engineering	3	5	125	2	2	0	4	CSE131
PHM111	Probability and Statistics	2	4	100	2	2	0	4	PHM013
PHM114	Numerical Analysis	3	5	125	2	2	0	4	PHM113
	ASU Elective (1)	2	3	75	2	1	0	3	
Total		17	30	750	13	9	4	26	
<b>Semester 5</b>									
CSE312	Electronic Design Automation	2	4	100	2	1	1	4	CSE112
CSE335	Operating Systems	3	5	125	2	2	0	4	CSE112
CSE232	Advanced Software Engineering	3	5	125	2	2	0	4	CSE334
CSE331	Data Structures and Algorithms	3	5	125	3	1	1	5	CSE231
PHM211	Discrete Mathematics	2	4	100	2	2	0	4	
ECE251	Signals and Systems Fundamentals	4	6	150	3	2	0	5	PHM111 PHM113
Total		17	29	725	14	10	2	26	
<b>Semester 6</b>									
CSE332	Design and Analysis of Algorithms	3	5	125	2	2	1	5	CSE331
CSE333	Database Systems	3	5	125	2	1	1	4	CSE331
CSE338	Software Testing, Validation, and Verification	3	7	175	2	2	1	5	CSE232
CSE371	Control Engineering	3	5	125	2	1	1	4	ECE251
CSE439	Design of Compilers	3	5	125	2	1	1	4	CSE131
CSE472	Artificial Intelligence	3	5	125	2	2	0	4	CSE131 PHM211
Total		18	32	800	12	9	5	26	
<b>Semester 7</b>									
CSE211	Introduction to Embedded Systems	3	5	125	2	2	2	6	CSE111 CSE131
CSE233	Agile Software Engineering	2	5	125	1	0	4	5	CSE232
CSE351	Computer Networks	3	5	125	2	2	0	4	
	Computer Engineering Level 3 Elective (1)	2	5	125	2	1	1	4	
EPM119	Engineering Economy and Investments	2	4	100	2	1	0	3	
ASU114	Selected Topics in Contemporary issues	2	2	50	2	0	0	2	
	ASU Elective (2)	2	2	50	2	0	0	2	
Total		16	28	700	13	6	7	26	
<b>Semester 8</b>									
CSE341	Internet Programming	3	5	125	2	1	2	5	CSE231
CSE354	Distributed Computing	3	4	100	2	2	1	5	CSE231 CSE351
CSE411	Real-Time and Embedded Systems Design	3	5	125	2	1	1	4	CSE211
CSE432	Automata and Computability	3	5	125	2	2	0	4	CSE332
	Computer Engineering Level 3 Elective (2)	2	5	125	2	1	1	4	
	Computer Engineering Level 3 Elective (3)	2	5	125	2	1	1	4	
ASU111	Human Rights	2	2	50	2	1	0	3	
Total		18	31	775	14	9	6	29	
<b>Semester 9</b>									



CSE336	Software Design Patterns	2	5	125	2	1	1	4	CSE232
CSE431	Mobile Programming	3	5	125	2	1	2	5	CSE341
CSE441	Software Project Management	2	4	100	2	1	0	3	CSE334
	Computer Engineering Level 4 Elective (1)	3	5	125	3	1	1	5	
	Computer Engineering Level 4 Elective (2)	3	5	125	3	1	1	5	
CSE491	Computer and Systems Engineering Graduation Project (1)	3	6	150	0	0	5	5	
Total		16	30	750	12	5	10	27	
<b>Semester 10</b>									
CSE451	Computer and Networks Security	3	5	125	2	1	1	4	CSE351
CSE455	High-Performance Computing	2	5	125	2	2	0	4	CSE112
	Computer Engineering Level 4 Elective (3)	3	5	125	3	1	1	5	
	Computer Engineering Level 4 Elective (4)	3	5	125	3	1	1	5	
CSE492	Computer and Systems Engineering Graduation Project (2)	3	6	150	0	0	5	5	CSE491
ASU113	Professional Ethics and Legislations	3	4	100	2	2	0	4	
Total		17	30	750	12	6	9	27	

## 7.5 Course Tree





## 7.6 Program Study Duration

- The minimum allowed study duration is nine main semesters.
- The maximum allowed study duration is twenty main semesters (ten years), which does not include frozen semesters for reasons accepted by the Faculty of Engineering Council, after which the student is dismissed from the programs.

## 7.7 Degree Awarding Requirements

- To obtain the Bachelor of Science Degree in Computer Engineering and Software Systems, the student must successfully complete the required Credit Hours in the program with a GPA at graduation of at least 2.0.
- The student must pass all zero-credit courses in the Program.
- A graduation project is an essential part of the program requirements for graduation. The graduation project may be completed over two successive semesters, as per the program requirement, and the student will not graduate unless he fulfils the project pass requirements. The student must earn at least 130 Credit Hours to register for the graduation project. If the project is divided along two semesters, the student must register them in their order.
- The student must perform Field Training for 12 weeks during his study duration.
- The student can study a number of courses in another University which has a cooperation agreement with Ain Shams University regarding the transfer of Credits. This requires prior approval from the Faculty of Engineering, Ain Shams University. The Credit Hours of these courses are included in the student's graduation requirements, provided that the total Credit Hours of these courses do not exceed 68 Credit Hours.

## 7.8 Field Training

- The student must perform Field Training for 12 weeks in an industrial or service facility related to the student's program and must be under the full supervision of the faculty. It is also possible to perform the training inside the faculty in a similar environment.
- The training follow-up will be handled by the academic advisor assigned by the Program Steering Committee.
- The training is divided into periods of 4 weeks at the end of the first, second, and third levels. (Can be in the fourth level as well – open during the semester)

## 7.9 Academic Advisor

- Every student is assigned an Academic Advisor who follows-up the student academic progress and assists him in selecting the courses each semester.
- The Program Academic Advisor is responsible for:
  - Helping the student to choose his academic path and helps him to select courses each semester.
  - Helping the student with the choice of the Field Training.
  - Helping the student with the choice of concentration and graduation project.

## 8. Contacts

**Website:** <https://eng.asu.edu.eg/education/undergraduates/bylaws/ug2018/programs/UG18IDCESS>

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