



College of Engineering & Information Technology

Computer Engineering (COE) Program

Program Structure (Curriculum)

About the Computer Engineering Program (COE):

Computer engineering is defined as the discipline that embodies the science, engineering and technology of design, construction, implementation, and maintenance of software and hardware components of modern computing systems and computer-controlled equipment, Digital Networking and Communication. Computer engineering has traditionally been viewed as a combination of both Computer Science (CS) and Electrical Engineering (EE).¹

Mission Statement

To prepare distinctive competencies in Computer Engineering in accordance with the requirements of the job market, to carry out effective scientific research and dissemination of knowledge, and to contribute to the development and service of local and national community institutions.

COE Program Educational Objectives (PEOs)

- Our graduates will effectively apply their knowledge and skills, and will successfully function in multi-disciplinary teams.
- Our graduates will continue to improve their knowledge through training, qualified certifications, or graduate studies.
- Our graduates will achieve professional success in a career employing Computer Engineering.
- Our graduates will demonstrate understanding towards communal obligations and ethical responsibilities.

COE Program Student Outcomes

The student outcomes for the COE program are:

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. 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.
4. An ability to function on multidisciplinary teams.
5. An ability to identify, formulate, and solve computer-engineering problems.

¹ The Joint Task Force on Computing Curricula; the IEEE Computer Society and the Association for Computing Machinery (ACM).

6. An understanding of professional and ethical responsibilities.
7. An ability to communicate effectively.
8. A broad education necessary to understand the impact of computer engineering solutions in a global, economic, environmental, and societal context.
9. Recognition of the need for, and an ability to engage in life-long learning.
10. Acknowledge of contemporary issues.
11. An ability to use the techniques, skills, and modern computer engineering tools necessary for engineering practice.

Degree Obtained by the Student

COE graduates are awarded a Bachelor of Science Degree in Computer Engineering.

Graduation Requirements

To become eligible for a Bachelor of Science degree in an engineering program, a student must fulfill the following requirements:

1. Completion of the number of semester-credit-hours required by the COE program with Cumulative and major GPAs of 2.00 or higher on a 5.00 point scale.
2. Completion of the prescribed and elective academic work required by the department.

Career opportunities for graduates

- Computer Engineer.
- Computer Systems Engineer.
- Computer Hardware Engineer.
- Electronic Engineer.
- Control Engineer.
- Communication Engineer.
- Computer Software Applications Engineer.
- Embedded Systems Development Engineer.
- Embedded System Software Engineer.
- Computer Networking Engineer.
- Server Hardware Engineer.
- Software Analyst & Developer.
- Testing and Maintenance Engineer.

Overall Program Curriculum Structure

Table (1): Overall Program Curriculum Structure

No.	Courses Types	Credit	
		Total	Percentage
1	Buraydah Private Colleges Core Courses	12	7.41%
2	College of Engineering and Information Technology Core Courses	34	20.99%
3	Computer Programs Core Courses	53	32.72%
4	Computer Engineering Program Core Courses	48	29.63%
5	Computer Engineering Program Elective Courses	15	9.26%
Total		162	100 %

Details of the Program Curriculum

First: Buraydah Private Colleges (UPC) Core Courses (12 Credits)

All Students at UPC must complete 12 credits (6 courses) of Islamic and Arabic courses. Table (2) below shows the details of these courses:

Table (2): Buraydah Private Colleges Core Courses – 12 Credits

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
ARB101	Linguistic Skills	2	0	2	-	-
ARB103	Arabic Writing	2	0	2	-	-
IC101	Introduction to Islamic Culture	2	0	2	-	-
IC102	Islam and Community Building	2	0	2	-	-
IC103	Economic System in Islam	2	0	2	-	-
IC104	Political System in Islam	2	0	2	-	-
Total		12	0	12		

Second: College of Engineering & Information Technology Core Courses (34 Credits)

All Students at College of Engineering & Information Technology must complete 34 credits (10 courses) of general courses in English, Math and Physics. Table (3) below shows the details of these courses:

Table (3): College of Engineering & Information Technology Core Courses – 34 Credits

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
ENG101	English I	4	8	8	-	-
PSYCH101	Thinking Skills and Learning Styles	2	0	2	-	-
STAT100	Statistics	2	0	2	-	-
PHYS110	General Physics I	2	0	2	-	-
CSC105	Computer Skills	2	4	4	-	-
ENG102	English II	2	6	5	ENG101	Pre-requisite
MATH105	Calculus	3	0	3	STAT100	Pre-requisite
PHYS115	General Physics II	3	0	3	PHYS110	Pre-requisite
CSC111	Computer Programming	2	2	3	CSC105	Pre-requisite
ENG 103	English for Engineering and Computer Science	2	0	2	ENG101	Pre-requisite
Total		24	20	34		

- Each theory-credited unit is equivalent to 50 lecture minutes.
- Each practical-credit unit is equivalent to 100 lab minutes.

Important Note: Calculation for the Equivalence of the English Courses

The two English courses (ENG 0011) and (ENG 0012) are not calculated (zero credit) in the GPA (Grade Point Average) of the student. The students who get certain IELTS or TOEFL scores can be exempted from one or both courses according to the following rules as shown in table (4)

Table (4): Calculation for the Equivalence of the English Courses

Mark equivalent to the English course (ENG 0012)	Mark equivalent to the English course (ENG 0011)	Mark	Certificate
Not exempted	A+	61-78	TOEFL (IBT)
A+	A+	79 and above	TOEFL (IBT)
Not exempted	A+	5 or 5.5	IELTS
A+	A+	6 and above	IELTS

Third: Computer Programs core courses (53 Credits):

All students taking Computer Sciences or Computer Engineering programs must complete (53) credits of compulsory courses in Math, Physics, Design and Computer. Table (5) below shows the details of these courses.

Table (5): Computer Programs core courses (53 Credits)

No.	Course Name	Course Code	Credit	Hours		Pre-requisite
				Theoretical	Practical	
1	Computer Programming II	CS 181	3	2	2	CSC111
2	Integral Calculus	MATH 106	3	3	-	MATH105
3	Linear Algebra and Analytical Geometry	MATH 107	3	3	-	
4	Introduction to Probabilities and Statistics	STAT 325	3	3	-	
5	Research Meth. & Ethical	COE390	2	2	-	
6	Computer Organization	COE 223	3	3	-	COE121
7	Computer Networks	COE 351	3	3	-	
8	Signals and Systems Analysis	EE 301	3	3	-	MATH208
9	Computer Networks Lab	COE 352	1	-	2	COE351*
10	General Physics III	PHYS 116	4	3	2	PHYS115
11	Logic Design	COE 121	3	3	-	
12	Logic Design Lab	COE 122	1	-	2	COE121*
13	Database	IT 131	3	2	2	
14	Computer Programming III	CS 182	3	2	2	CS181
15	Concepts of Algorithms	CS 211	3	3	-	CS181
16	Data Structures	CS 214	3	2	2	CS182
17	Differential Equations	MATH 208	3	3	-	MATH106
18	Operating Systems	CS 222	3	3	-	
19	Software Engineering	CS383	3	3	-	CSC111
Total			53	46	14	-

Fourth: Computer Engineering Program core courses (48 Credits):

All students taking Computer Engineering Program must complete (48) credits of compulsory courses in Computer Engineering. Table (6) below shows the details of these courses.

Table (6): Computer Engineering Program core courses (48 Credits)

No.	Course Name	Course Code	Credit	Hours		Pre-requisite
				Theoretical	Practical	
1	Electric Circuits	EE 201	3	3	-	PHYS116 EE204*
2	Electric Circuits Lab	EE 204	1	-	2	EE201*
3	Electronics	EE 312	3	3	-	EE201 EE313*
4	Electronics Lab	EE 313	1	-	2	EE312*
5	Human Computer Interaction (HCI)	COE 231	2	2	-	CS111
6	Assembly Language	COE 224	3	3	-	COE223
7	Signals Processing Lab	EE 302	1	-	2	EE301*
8	Microcontroller Applications	COE 332	2	-	4	COE325
9	Computer Systems Engineering	COE 333	3	2	2	CS383
10	Microprocessors Systems	COE 325	3	3	-	EE201 COE224 COE326*
11	Microprocessors Systems Lab	COE 326	1	-	2	COE325*
12	Embedded Systems	COE 434	3	3	-	COE325 COE435*
13	Embedded Systems Lab	COE 435	1	-	2	COE434*
14	VLSI	COE 415	3	3	-	EE312
15	Discrete Mathematics	MATH 212	3	3	-	
16	*Training Options (A and B)	Group	15	-	-	Advisor
Total			48	25	16	-

*There two different options for training in the department of Computer Engineering and students in this department must complete 15 credits in one of these options. Tables 7 & 8 gives details for these two options:

Table 7: Option (A): Summer Training (summer)

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE391	Summer Training	0	2	1	65 C.H.	Pre-requisite
COE498	Graduation Project (I)	2	0	2	85 C.H.	Pre-requisite
COE499	Graduation Project (II)	3	0	3	COE498	Pre-requisite
COExxx	COE Optional (IV)	3	0	3	Advisor's Approval	
COExxx	COE Optional (V)	3	0	3	Advisor's Approval	
COExxx	COE Optional (VI)	3	0	3	Advisor's Approval	
Total		14	2	15		

Table 8: Option (B): CO-OP (summer + one semester)

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE494	Cooperative Training (I)	0	8Weeks	4	85 C.H.	Pre-requisite
COE495	Cooperative Training (II)	0	16Weeks	8	COE494	Pre-requisite
COE496	CO-OP Graduation Project	3	0	3	COE495	Pre-requisite
Total		3	24	15		

Fifth: Computer Engineering Department Elective Courses (15 Credits)

All Students taking Computer Engineering must choose and complete (15) credits out of 63 credits of the department elective courses. Table (9) below shows the details of these courses:

Table 9: the Computer Engineering Department Elective Courses (15) Credits

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE416	VLSI System Design using VHDL	3	0	3	Advisor's Approval	
COE417	VLSI Design, Test, and Verification	3	0	3	Advisor's Approval	
COE418	Digital Electronics	3	0	3	Advisor's Approval	
COE427	Advanced Computer Architecture	3	0	3	Advisor's Approval	
COE428	Parallel Processing	3	0	3	Advisor's Approval	
COE429	Advanced Digital Logic Design	3	0	3	Advisor's Approval	
COE432	Digital Control Systems	3	0	3	Advisor's Approval	
COE436	Advanced Embedded Systems	3	0	3	Advisor's Approval	
COE437	Real Time Operating Systems	3	0	3	Advisor's Approval	
COE441	Robotics and Control	3	0	3	Advisor's Approval	
COE442	Artificial Intelligent and Expert Systems	3	0	3	Advisor's Approval	
COE443	Computer Vision & Pattern Recognition	3	0	3	Advisor's Approval	
COE453	Communication Systems	3	0	3	Advisor's Approval	
COE454	Wireless networks and Mobile Computing	3	0	3	Advisor's Approval	
COE455	Computer and Network Security	3	0	3	Advisor's Approval	
COE456	Wireless Communication Systems	3	0	3	Advisor's Approval	
COE457	Cloud computing	3	0	3	Advisor's Approval	
COE463	Digital Signal Processing	3	0	3	Advisor's Approval	
COE464	Image and Multimedia Processing	3	0	3	Advisor's Approval	
COE492	Special Topics in Computer Engineering I	3	0	3	Advisor's Approval	
COE493	Special Topics in Computer Engineering II	3	0	3	Advisor's Approval	

Overall structure of Computer Engineering Program

- Total Credit Hours: **162 Credit Hours**.
- Each **theory-credited unit** is equivalent to **50** lecture minutes.
- Each **practical-credit unit** is equivalent to **100** lab minutes.

First Year (Freshman Students)

1st Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
ENG101	لغة إنجليزية 1 English I	4	8	8	-	-
PSYCH101	مهارات التفكير وأساليب التعلم Thinking Skills and Learning	2	0	2	-	-
STAT100	إحصاء Statistics	2	0	2	-	-
PHYS110	فيزياء عامة 1 General Physics I	2	0	2	-	-
CSC105	مهارات الحاسب Computer Skills	2	4	4	-	-
				18		

2nd Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
ENG102	لغة إنجليزية 2 English II	2	6	5	ENG101	Pre-requisite
MATH105	حساب التفاضل Calculus	3	0	3	STAT100	Pre-requisite
PHYS115	فيزياء عامة 2 General Physics II	3	0	3	PHYS110	Pre-requisite
CSC111	برمجة الحاسب Computer Programming	2	2	3	CSC105	Pre-requisite
ENG103	لغة إنجليزية للهندسة وعلوم الحاسب English for Engineering and Computer Science	2	0	2	ENG101	Pre-requisite
				16		

Second Year (Sophomore Students)

3rd Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
CS181	برمجة الحاسب 2 Computer Programming II	2	2	3	CSC111	Pre-requisite
PHYS116	فيزياء عامة 3 General Physics III	3	2	4	PHYS115	Pre-requisite
MATH106	حساب التكامل Integral Calculus	3	0	3	MATH105	Pre-requisite
ARB101	مهارات لغوية Linguistic Skills	2	0	2	-	-
COE121	تصميم منطقي Logic Design	3	0	3	-	-
COE122	معمل تصميم منطقي Logic Design Lab	0	2	1	COE121	Co-requisite
Total				16		

4th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
MATH107	جبر خطي والهندسة التحليلية Linear Algebra and Analytical Geometry	3	0	3	-	-
IT131	قواعد بيانات Database	2	2	3	-	-
CS182	برمجة حاسب 3 Computer Programming III	2	2	3	CS181	Pre-requisite
STAT325	مقدمة للاحتتمالات والإحصاء Introduction to Probability & Statistics	3	0	3	-	-
IC101	مقدمة للثقافة الإسلامية Introduction to Islamic Culture	2	0	2	-	-
COE223	تنظيم الحاسب Computer Organization	3	0	3	COE121	Pre-requisite
Total				17		

Third Year (Junior Students)

5th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
CS214	تراكييب البيانات Data Structures	2	2	3	CS182	Pre-requisite
MATH212	رياضيات متقطعة Discrete Mathematics	3	0	3		
IC102	الإسلام وبناء المجتمع Islam and Community Building	2	0	2	-	-
CS211	مفاهيم الخوارزميات Concepts of Algorithms	3	0	3	CS182	Pre-requisite
MATH208	معادلات تفاضلية Differential Equations	3	0	3	MATH106	Pre-requisite
EE201	دوائر كهربائية Electric Circuits	3	0	3	PHYS116	Pre-requisite
EE204	معمل الدوائر الكهربائية Electric Circuits Lab	0	2	1	EE201	Co-requisite
Total				18		

6th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE224	لغة التجميع Assembly Language	3	0	3	COE223	Pre-requisite
ARB103	تحرير عربي Arabic Writing	2	0	2	-	-
CS222	أنظمة التشغيل Operating Systems	3	0	3	-	-
COE231	إتصال الإنسان بالآلة Human Computer Interaction (HCI)	2	0	2	CS111	Pre-requisite
EE312	إلكترونيات (1) Electronics I	3	0	3	EE201 EE313	Pre-requisite Co-requisite
EE313	معمل إلكترونيات (1) Electronics Lab (I)	0	2	1	EE312	Co-requisite
EE301	تحليل الإشارات ونظم Signals and Systems Analysis	3	0	3	MATH208	Pre-requisite
EE302	معمل معالجة الإشارات Signals Processing Lab	0	2	1	EE301	Co-requisite
Total				18		

Forth Year (Senior Students)

7th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
CS383	هندسة البرمجيات Software Engineering	3	0	3	-	-
COExxx	ساعات اختيارية في هندسة الحاسب (1) COE Optional (I)	3	0	3	-	-
COE351	شبيكات الحاسب Computer Networks	3	0	3	-	-
COE352	معمل شبكات الحاسب Computer Networks Lab	0	2	1	COE351	Co-requisite
COE325	أنظمة الميكروبروسيسور Microprocessors Systems	3	0	3	EE201 COE224 COE326	Pre-requisite Pre-requisite Co-requisite
COE326	معمل أنظمة الميكروبروسيسور Microprocessors Systems Lab	0	2	1	COE325	Co-requisite
IC103	النظام الاقتصادي في الإسلام Economic System in Islam	2	0	2	-	-
Total				16		

8th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE390	طرق بحث وقضايا أخلاقية Research Methodologies & Ethical Issues	2	0	2	Advisor's Approval	
COExxx	ساعات اختيارية في هندسة الحاسب (2) Free Hours (I)	3	0	3	Advisor's Approval	
COE434	الأنظمة المدمجة Embedded Systems	3	0	3	COE325 COE435	Pre-requisite Co-requisite
COE435	معمل الأنظمة المدمجة Embedded Systems Lab	0	2	1	COE434	Co-requisite
COE333	هندسة أنظمة الحاسب Computer Systems Engineering	3	0	3	CS383	Pre-requisite
COE332	تطبيقات الميكروكنترولر Microcontroller Applications	0	4	2	COE325	Pre-requisite
COE415	الدوائر المتكاملة واسعة النطاق VLSI	3	0	3	EE312	Pre-requisite
Total				17		

Fifth Year (Super Senior Students)

Option (A): Summer Training.

Summer Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE391	تدريب صيفي Summer Training	0	2	1	65 C.H.	Pre-requisite
Total				1		

9th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
IC104	النظام السياسي في الإسلام Political System in Islam	2	0	2	-	-
COExxx	ساعات اختيارية في هندسة الحاسب (3) COE Optional (II)	3	0	3	-	-
COExxx	ساعات اختيارية في هندسة الحاسب (4) COE Optional (III)	3	0	3	-	-
COExxx	ساعات اختيارية في هندسة الحاسب (5) COE Optional (IV)	3	0	3	-	-
COE498	مشروع تخرج (1) Graduation Project (I)	2	0	2	85 C.H.	Pre-requisite
Total				13		

10th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COExxx	ساعات اختيارية في هندسة الحاسب (6) Free Hours (II)	3	0	3	-	-
COExxx	ساعات اختيارية في هندسة الحاسب (7) COE Optional (V)	3	0	3	-	-
COExxx	ساعات اختيارية في هندسة الحاسب (8) COE Optional (VI)	3	0	3	-	-
COE499	مشروع تخرج (2) Graduation Project (II)	3	0	3	COE498	Pre-requisite
Total				12		

Total Credits = 162 Credits.

Fifth Year (Super Senior Students)

Option (B): CO-OP

Summer Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE494	تدريب تعاوني (1) Cooperative Training (I)	0	8 Weeks	4	85 C.H.	Pre-requisite
Total				4		

9th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COE495	تدريب تعاوني (2) Cooperative Training (II)	0	16 Weeks	8	COE494	Pre-requisite
Total				8		

10th Semester

Course Code	Course Name	Theory	Practical	Total Credits	Requisite	Requisite Type
COExxx	COE Optional (II)	3	0	3	-	-
YYYxxx	Free Hours (II)	3	0	3	-	-
COExxx	COE Optional (III)	3	0	3	-	-
IC104	النظام السياسي في الإسلام Political System in Islam	2	0	2	IC103	Pre-requisite
COE496	مشروع تخرج التدريب التعاوني CO-OP Graduation Project	3	0	3	COE495	Pre-requisite
Total				14		

Total Credits = 162 Credits.