Prince Sattam bin Abdulaziz University

College of Computer Engineering and Science

Department of Computer Science

BSc. Computer Science program

Student Handbook

2023

Contents

Chairman's Message

Today, the world is actively witnessing technical mobility based on the movement of scientific and distinctive research, from which all nations seek to reach the leadership scientifically, technically and culturally. The field of computer technology is not an exception from this, however the modernization and development in this area is the fastest in the world.

In line with the scientific renaissance taking place in the Kingdom of Saudi Arabia and strive to achieve the objectives of development in the Kingdom, and from this perspective began to pave the way for the establishment of the College of Computer Engineering and Sciences at Al-Kharj city. The mission of the department is to offer a prestigious and accredited academic program that provides graduates with the opportunity and the ability to take the leadership, and promote development in the country in the field of computer science. The department is keen to provide a suitable environment in which students, faculty members and private sector partners working on the graduation of specialists in computer science with high efficiency and leadership skill to significantly contribute to business, education and scientific research sectors.

In spite of it is a young department, but it has set an ambitious vision and dashed towards achieving its objectives through the adoption of an integrated methodology and application of a package of assessment policies and continuous updating of all the activities of the department, and based on modern concepts of quality in academic work, so that the graduate of the department will be armed with theoretical knowledge and practical skills.

Educational philosophy of the department is based on the diversification of the advanced teaching and learning methods. In furtherance of this philosophy, the department is working hard to adopt multiple methods of learning by solving problems, learning by practice through field training and graduation projects and linked them to the practical side, and other modern methods.

Finally, the department always aspires for better level of academic education through the provision of supportive and encouraging educational and research organization and community participation. Also we congratulate our students for their selection to study at the Computer Science Department with all our best wishes for a prosperous professional future.

Chairman of the Computer Science Department

Computer Science Department

The department of computer science was established by the thirty-eighth session of the higher education council on 26 Jumadal'ula 1426H, as one of the departments of the college of computer engineering and sciences/Al-Kharj branch of King Saud University, then began the study in the department with the beginning of the second semester of the academic year 1427-1428 H. The department offers computer science program. Students who satisfy the requirements of the program are awarded a Bachelor of Science degree in computer science to prepare a highly competent creative workforce in the field of computer science.

Several significant changes, notably in the number of students, graduates and faculty, have marked the department growth since its establishment. At the first graduation ceremony, 29 students graduated from the department in the year 1431/1432, while the total batches of graduates now exceed 5 batches. These graduates, who hold BSc are now assuming reputable positions in the Kingdom of making substantial contribution to its development and progress.

the Department of Computer Science has committed since its establishment to consolidate scientific knowledge and practical experience in the field of computer science through a comprehensive updating for all the contents of the courses to reflect the current situation to the field of computer science and enable students to keep pace with the latest and rapid developments witnessed in this field.

BACHELOR OF SCIENCE IN COMPUTER SCIENCE PROGRAM

Vision
Excellence and leadership in the field of computer science at the national and regional level

Mission
Preparing highly qualified graduates in computer science, through introducing high quality education that prepares the students for professional careers and develops their skills in research and innovation, in order to contribute effectively in developing knowledge society and achieving national goals

Program Educational Objectives
Graduates in Computer Science would accomplish the following PEOs within a few years of their graduation.

PEO 1. Practice professionally as individuals or team members with minimum guidance

PEO 2. Engage in lifelong learning to develop their skills or advance in graduate studies

PEO 3. Apply appropriate practices within a professional, legal, and ethical framework, positively contributing to society.

Student Outcomes
Upon graduation, a graduate in computer science is expected to have the following ability:

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Student Admissions
Students are firstly admitted to the Prince Sattam bin Abdulaziz University (PSAU), then admitted to the College of Computer Engineering and Sciences (CCES), and finally admitted to the Computer Science/Information Systems/Software Engineering program.

The PSAU Council decides the terms and conditions of admission, and the number of students who can be accepted in the academic year, based on the proposal of the college councils. The admission of the new student shall be according to the following requirements:

1. He must have obtained a high school diploma or its equivalent inside or outside the Kingdom. The University Council decides on the equivalence of diplomas from within the Kingdom for the purpose of admission based on the recommendation of the College Council.
2. No more than five years have passed since high school or its equivalent.
3. To be of good conduct and behaviour.
4. To successfully pass any test or personal interview deemed by the University Council.
5. Perform aptitude test.
6. Performing the achievement test for the disciplines that require it.
7. To be medically fit.
8. To obtain approval from his reference to study if he works in any governmental or private entity.
9. He must fulfil any other conditions determined by the University Council and announced at the time of submission.
10. He should not be dismissed from another university for disciplinary reasons.

11. Those who hold a bachelor's degree, or its equivalent may not be accepted to obtain another bachelor's degree.

The PSAU admission criterion dedicated to health, engineering, and scientific specializations is based on the compound percentage of university's scientific specializations. It is the cumulative average for secondary school, the achievement test, and the general abilities test (for male and female students who meet the general admission requirements) according to the following weights:

- Cumulative Secondary School Weight 30%
- General Capacity Test Score Weight 30%
- Achievement Test Score 40%

The Compounded Ratio is calculated as follows:

Compound Ratio = (Cumulative General Secondary Ratio x 0.30) + (General Capacity Score x 0.30) + (Achievement Test Score x 0.40)

Thus, students admitted to the College of Computer Engineering and Sciences (CCES), the College of Engineering, and the College Sciences and Humanities, spend one academic year at the Preparatory Year before they are distributed to these colleges based on the following criteria:

1. Student preference.
2. Cumulative grade point average (CGPA).
3. The capacity of each College.

Similarly, students admitted to the CCES are distributed to the college programs, including the Computer Science/Information Systems/Software Engineering program, after two trimesters. The CCES Council decides the terms and conditions of admission, and the number of students who can be accepted in each program, based on the recommendations of the department councils. Thus, the admission of the new student to the program shall be according to the following criteria:

1. Student preference.
2. Student cumulative grade point average (CGPA).
3. Available seats at the program.
4. Student successfully passes any courses specified by the program.

Transfer Students and Transfer Courses

Transfer Students from Outside PSAU

Transfer from another university to Prince Sattam bin Abdulaziz University (PAU) is subjected to the following:

1. That the student has studied at a local university or college, or a foreign university, college, or educational institution. Provided that it has been licensed by the competent authority in the country of study and that it is from universities, colleges, universities, educational institutions, or programs classified by the Ministry of Education.
2. He should not be dismissed from another university for disciplinary or academic reasons.
3. To submit his application within the specified period for external transfer in the academic calendar through the external transfer portal via the link https://transfer.psau.edu.sa/
4. He must meet the transfer conditions set by the College Council.
5. The number of prescribed units that a transferred student is required to study at the PSAU must not be less than (60%) of the number of units required to obtain a bachelor's degree from the university.

Courses Equivalency for Transfer Students from Outside PSAU

The council of the college or institute to which the course is affiliated undertakes the equivalency of the courses that the student has passed from another university based on the recommendation of the departments that offer the course according to the following rules:

1. The course that the student passed should be equal in content or equivalent, not less than (80%), and the number of its academic units not less than the academic units of the course to be equalized, whether credit hours or actual hours at the PSAU according to the following conditions:
2. The maximum percentage of academic units that can be equalized from outside the university is (40%) of the total credits for graduation from the PSAU.
3. The student's grade should not be less than good in the course to be equalized.
4. The courses that have been equalized for him are recorded in the student's academic record, including the grade obtained in each course, but it is not included in calculating his cumulative average.

Calculating the regular period for the student after accepting the equivalency of the courses he studied outside the university is in accordance with the following:
1. One trimester is calculated within the period for every (15) academic units that are equalized.
2. The calculation includes the student's entitlement to reward, calculating opportunities, and honours.

Transfer Students within PSAU

A student may be transferred from one college to another within the university, from one department to another within the college, and from one major to another within the university, according to the rules approved by the University Council or whomever it delegates.

A student may be transferred from one college to another after the approval of the dean of the college to which the student wishes to transfer; in accordance with the rules approved by the College Council.

A student may be transferred from one department to another within the college and from one major to another within the department after the approval of the College Dean; according to the rules approved by the College Council.

The college council to which the course belongs equalizes the courses passed by the student transferred from one college to another within the university, from one department to another within the college, and from one specialization to another within the department, based on the recommendation of the department offering the course, provided that the course passed by the student is equivalent to a score of no less than (80%), and the number of its academic units is not less than the units of the course to which it is intended to be equalized, whether credit or actual hours.

It is fixed and counted in the academic record of a student transferred from one college to another within the university, from one department to another within the college, or from one major to another, all the courses he has previously studied and equalized, it includes the grade that student obtained in each course, and all the courses he studied at the university are included in calculating his accumulative average.

Transfer Courses from Outside PSAU

A student may, after the approval of the college in which he is studying, study one or more academic courses at another university within the Kingdom, or outside it, or in a branch of the university to which he belongs without transferring him, provided that his studies coincide with his studies at his university or as a visiting student, and the courses that he studied are equalized and recorded in his academic record according to the following rules:

1. The student must have an academic record with a cumulative average for at least one trimester in the college or university he is enrolled in before his request as a visiting student.
2. Obtaining prior approval from the student's college to allow him to study as a visiting student, specifying courses which he will study, and directing the student to study by an official letter from the Deanship of Admission and Registration.
3. The course that the student is studying outside the university must be equivalent in contents and its academic units are not less than one of the courses included in the graduation requirements.
4. The maximum number of credits that can be counted for a visiting student from any branch of the university's branches or outside it is (40%) of the total graduation units at PSAU.
5. The visiting student is given a successful grade without a grade of (NP) if he passes the course with a grade of (good) or above.
6. The student must provide the Deanship of Admission and Registration with the results he obtained within two weeks of the commencement of the studying in the first trimester following his study period as a visitor. And if he does not present his results, he is considered discontinued.

Evaluating Student Performance

Student performance is assessed through a combination of coursework and final examinations. The total mark is calculated for each course at the end of a trimester out of 100 marks. The coursework carries 50% to 60% of the total mark where the final examination contributes the balance of 100%. The coursework components are designed by the instructor, which may include any combination of written test(s), homework, quizzes, assignments, lab work, term project or oral test.

Prince Sattam bin Abdulaziz University study and examinations regulations are the base for conducting and evaluating coursework and final examinations for all courses offered. The grades obtained by the student in each course are calculated as in Table 1-1.

Table 1-1. PSAU Grading System

Mark	Letter Grade	Grade in English	Points	Comment

95 – 100	A+	Exceptional	5.0	
90 and < 95	A	Excellent	4.75	
85 and < 90	B+	Superior	4.5	
80 and < 85	B	Very good	4.0	
75 and < 80	C+	Above average	3.5	
70 and < 75	C	Good	3.0	
65 and < 70	D+	High pass	2.5	
60 and < 65	D	Pass	2.0	
< 60	F	Fail	1.0	
--	IP	In-progress	--	Course continues for next trimester
--	IC	Incomplete	--	Requirements not complete
--	DN	Denial	1.0	Attendance < 75%
>=60	NP	Nograde-pass	--	Passed without a grade
< 60	NF	Nograde-fail	--	Failed without a grade
--	W	Withdrawn	--	Optionally withdraw
--	E	Exemption	--	Exempted from the course

The student can register online to an optimum according to the study plan and/or with the help of his academic advisor. The minimum academic load for a student is (9 credits), and the maximum is (18 credits). Table 1-2 shows a sample of student's GPA who registered for four courses in a typical trimester.

Table 1-2. GPA calculation example

Course	Credit Hours (CH)	Grade Obtained	Grade Points (GP)	Course Grade Points (CHxGP)
Course-1	4	A	4.75	19
Course-2	5	B+	4.5	22.5
Course-3	4	D	2.0	8
Course-4	4	C+	3.5	14
Total	17			63.5
GPA = Total Grade Points/Credit Hours = 63.5/17 = 3.74				

Graduation Requirements / Program Structure

1- Distribution of credit hours according to the institutional model

B.Sc in Computer Science Program requires total of ١٣٩ credit hours for graduation. The table in this section shows the distribution of total credit hours among university, college, and department requirements according to the institutional model.

Table 1- Program Requirements

No.	Category	Credit Hours	Percentage
2	University Requirements	12	8.63%
3	College Requirements	61	43.88%
4	Department Requirements	57	41.01%

5	Department Electives	9	6.48%
Total		139	100%

As described in Table 1, students need to successfully pass ١٣٩ credit hours with minimum GPA of 2.00 or higher on a 5.00 point scale to get awarded the degree in B.Sc in Computer Science

1.2 University Requirements (12 Credit hours):

This section enumerates the courses required to complete university requirements. This amounts to 12 credit hours constituting 8.63% of program requirements.

University Core Requirements (10 Credit hours):

The following table shows the courses that are mandate at university level.

Table 2- Compulsory Courses for University requirements

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
IC	101	Introduction of Islamic Culture	--	-	2	2	0	0
IC	102	The Islam and Society Building	---	---	٢	٢	0	0
IC	103	The Foundation of the Economic System in Islam	---	---	2	2	0	0
ARAB	101	Language Skills	---	---	2	2	0	0
ARAB	103	Arabic Editing	---	---	2	2	0	0
Total					10	10	0	0

University Elective Requirements (2 Credit hours):

The following table shows the Islamic elective courses offered at university level. The students can choose 2 credit hours from the table to complete the Islamic elective requirement

Table 6- Islamic Elective courses

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
IC	104	Foundations of the political system in Islam	---	---	2	2	0	0
ISLM	106	Prophetic Biography	---	---	2	2	0	0

1.2 College Requirements (61 Credit hours):

The following table shows the courses mandate at College level that amounts to 61 credit hours constituting 43.88% of program requirements

Table 3- College Requirements

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
MC 1400		Communication Skills	---		2	٢	.	.

ENGL1210	Reading Skills	---		٣	3	3	·
ENGL1220	Writing Skills	---		٣	3	3	·
ENGL1230	Listening and Speaking skills	---		٣	3	٣	·
ENGL 1604	English for Technical Purposes	---		٣	٣	٣	·
IT 1400	Computer Skills	---		٣	2	·	2
MATH1050	Differential calculus	---		3	٣	٢	0
MATH1060	Integral calculus	MATH1050		٣	٣	٢	·
MATH2220	Linear Algebra for Computer Students	---		٣	٣	١	·
STAT1050	Probability and Statistics for Computer Students	---		٣	٣	١	·
PHYS1010	General physics(I)	---		٤	3	١	١
PHYS1040	General Physics(II)	PHYS1010 MATH1060		4	3	1	1
CS 1112	Discrete Mathematics	---		٤	٤	·	·
CS 1301	Computer Programming 1	---		٤	٣	٢	·
CS 2301	Computer Programming 2	CS 1301		٤	٣	٢	·
CS 3001	Computing ethics and research methods	At least 7٠ C.H		٣	٣	·	·
CS 3701	Operating Systems	---		3	3	0	0
IS 2511	Fundamentals of Database Systems	---		3	2	2	0
CE 1111	Logic Design	---		3	3	1	0
Total				٦١	٥٥	٢٧	4

1.3 Department Requirements (57 Credit hours):

The following table shows the courses mandate at department level that amounts to 57 credit hours constituting 41.01% of program requirements

Table 4- Department Requirements

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
CE	2471	Computer Architecture and Assembly language	CE1111		٣	٢	·	2
CE	3761	Computer Network Systems	CE2471		٣	٣	·	·
CE	3791	Computer Network Systems Lab	CE3761		1	0	0	2
CS	2311	Data Structures	CS2301		٤	٢	٢	·

Code	NO.	Course Title	Pre-requisite		C.H	L	T	LB
CS	2401	Computation Theory	CS1112		3	3	1	0
CS	3401	Algorithm Design and Analysis	CS2311		٣	٣	.	.
CS	٣٥٠١	Artificial Intelligence			٣	٣	.	.
CS	4654	Digital Image Processing	CS3401		٣	٢	0	2
CS	3801	Fundamental of Cyber Security	IS2511		3	3	0	0
CS	3821	Web Application Programming	IS2511		3	2	0	2
CS	4311	Advanced Programming	Cs2301		٣	٢	٢	.
CS	4321	Programming Languages & Compilers	--		4	3	1	0
CS	4901	Field Training	At least 74 C.H		3	0	0	6
CS	4912	Graduation Project I	At least 80 C.H		3	3	0	0
CS	4921	Graduation Project II	CS4912		٣	3	.	0
SE	2111	Fundamentals of Software Engineering	CS2301		3	3	0	0
MATH	2540	Numerical Methods	MATH2220		٣	٣	١	.
CS	4841	Distributed Systems	CS3701		٣	٣	١	.
CS	4552	Machine Learning	CS3501		٣	٣	.	.
Total					٥٧	٤٦	8	14

1.4 Elective Department Requirements (9 Credit hours):

The following table shows the elective courses that amounts to 9 credits hours constituting 6.48

% of the total program requirements. The students can choose 9 credit hours from the table to complete the department elective requirements.

Table 5- Department Elective courses

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
SE	1010	Emerging Digital Technologies	--		2	2		
CS	3101	Seminar in Undergraduate Advanced Research			٢	٢		
SE	3111	Human Computer Interaction	SE2111		3	3	0	0
CS	4201	Soft Computing	CS3501		3	3	0	0
CS	4211	Simulation and Modeling	STAT 1050		3	2	1	0
CS	4221	Parallel Processing	CS3701		3	3	0	0
CS	4411	Information Retrieval Systems	IS2511		3	3	0	0

CS	4511	Natural Languages Processing	CS3501		3	3	0	0
CS	4531	Neural Networks	CS3501		3	3	0	0
SE	4541	Advanced Software Engineering	CS2111		3	3	0	0
CS	4561	Pattern Recognition	CS2311		3	3	0	0
CS	4601	Multimedia System Development	CS2311		3	3	0	0
CS	4621	Computer Vision	-		3	2	0	2
CS	4641	Computer Arabization	CS2311		3	2	0	2
CS	4731	Systems Programming & Administration	CS3701		3	2	0	2
CE	4740	Cloud Computing	CE3761		3	3	0	0
CS	4741	Computer System Performance	-		3	3	0	0
CE	4760	Mobile and Wireless Networking	CE3761		3	3	0	0
CE	4801	Robotics and Automation	CS3501		3	2	0	2
CS	4811	Cybercrime	CS3801		3	3	0	0
CS	4821	Cryptography	CS3801		3	3	0	0
CS	4831	Mobile Application Development	CE3761		3	2	0	2
CS	4851	Computer Networks Management	CE3761		3	3	0	0
CS	4861	Network Security	CE3761		3	2	0	2
CS	4871	Mobile Network Security	CS3801		3	3	0	0
CS	4881	Computer Forensics and Investigations	CS3801		3	2	0	2
CS	4891	Disaster Recovery Planning	CS3801		3	3	0	0
CS	4931	Special Topics in Computer Science	-		4	4	0	0
CS	4941	Related Issues in Computer Science	-		3	3	0	0
CS	4951	Professional Certificates	-		3	2	0	2
CS	4961	Advanced Database systems	IS2511		3	3	0	0
CS	4991	Research	-		3	3	0	0

2- Distribution of credit hours according to specialized professional model

The degree requirements are summarized according to the following table, with a total of ١٣٩ units distributed between general study requirements, mathematics and science requirements, and compulsory department requirements:

No.	Category	Credit Hours	Percentage
1	General Studies	٢٩	20.86%
2	Basic Science and Mathematics	27	19.42%
3	Department Core	٧٤	53.24%
4	Department Elective	٩	6.48%
Total		139	100.00%

2.1 General studies Requirements (29 Credit hours):

The following table shows the general studies courses that amounts to 29 credit hours constituting 20.86% of the total program requirements

Table 5- General studies core courses

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
IC	101	Introduction of Islamic Culture	--	-	2	2	0	0
IC	102	The Islam and Society Building	---	---	٢	٢	0	0
IC	103	The Foundation of the Economic System in Islam	---	---	2	2	0	0
ARAB	101	Language Skills	---	---	2	2	0	0
ARAB	103	Arabic Editing	---	---	2	2	0	0
MC	1400	Communication Skills	---		2	٢	٠	٠
ENGL	1210	Reading Skills	---		٣	3	3	٠
ENGL	1220	Writing Skills	---		٣	3	3	٠
ENGL	1230	Listening and Speaking skills	---		٣	3	٣	٠
ENGL	1604	English for Technical Purposes	---		٣	٣	٣	٠
IT	1400	Computer Skills	---		٣	2	٠	2
Total					27	26	12	2

Table 6- General Studies Elective courses

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
IC	104	Foundations of the political system in Islam	---	---	2	2	0	0
ISLM	106	Prophetic Biography	---	---	2	2	0	0

1. Basic Science and Mathematics Requirements (27 Credit hours):

This section enumerates the basic science and mathematics courses that amounts to 27 credit hours constituting 19.42% of the total program requirements

Mathematics Requirements (19 Credit hours):

The following table shows the mathematics courses that amounts to 19 credit hours

Table 5- Mathematics courses

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
CS	1112	Discrete Mathematics	---		٤	٤	·	·
MATH	1050	Differential calculus	---		3	٣	٢	0
MATH	1060	Integral calculus	MATH1050		٣	٣	٢	·
MATH	2220	Linear Algebra for Computer Students	---		٣	٣	١	·
MATH	2540	Numerical Methods	MATH2220		٣	٣	١	·
STAT	1050	Probability and Statistics for Computer Students	---		٣	٣	١	·
Total					19	19	7	0

Science Requirements (19 Credit hours):

The following table shows the basic science courses that amounts to 8 credit hours

Table 5- Basic science courses

Course NO.		Course Title	Pre-requisite	Co-requisite	C.H	Distribution		
Code	NO.					L	T	LB
PHYS	1010	General physics(I)	---		٤	3	١	١
PHYS	1040	General Physics(II)	PHYS1010 MATH1060		4	3	1	1
Total					8	6	2	2

2. Department Core Requirements (74 Credit hours):

The following table shows the department core courses that amounts to 74 credit hours constituting 53.24%of the total program requirements

Course NO.	Course Title			C.H	Distribution

Code	NO.		Pre-requisite	Co-requisite		L	T	LB
CS	1301	Computer Programming 1	---		٤	٣	٢	.
CS	2301	Computer Programming 2	CS 1301		٤	٣	٢	.
CS	3001	Computing ethics and research methods	At least ٧٠ C.H		٣	٣	.	.
CS	3701	Operating Systems	---		3	3	0	0
IS	2511	Fundamentals of Database Systems	---		3	2	2	0
CE	1111	Logic Design	---		3	3	1	0
CE	2471	Computer Architecture and Assembly language	CE1111		٣	٢	.	2
CE	3761	Computer Network Systems	CE2471		٣	٣	.	.
CE	3791	Computer Network Systems Lab	CE3761		1	0	0	2
CS	2311	Data Structures	CS2301		٤	٢	٢	.
CS	2401	Computation Theory	CS1112		3	3	1	0
CS	3401	Algorithm Design and Analysis	CS2311		٣	٣	.	.
CS	٣٥٠١	Artificial Intelligence	CS2311		٣	٣	.	.
CS	4654	Digital Image Processing	CS3401		٣	٢	.	2
CS	3801	Fundamental of Cyber Security	IS2511		3	3	0	0
CS	3821	Web Application Programming	IS2511		3	2	0	2
CS	4311	Advanced Programming	Cs2301		٣	٢	٢	.
CS	4321	Programming Languages & Compilers	--		4	3	1	0
CS	4901	Field Training	At least 74 C.H		3	0	0	6
CS	4912	Graduation Project I	At least 80 C.H		3	3	0	0
CS	4921	Graduation Project II	CS4912		٣	3	.	0
SE	2111	Fundamentals of Software Engineering	CS2301		3	3	0	0
CS	4841	Distributed Systems	CS3701		٣	٣	١	.
CS	4552	Machine Learning	CS3501		٣	٣	.	.
			Total		٧٤	٦٠	١٤	14

4. Department Elective Requirements (9 Credit hours):

The following table shows the department elective courses that amounts to 9 credit hours constituting 6.48%

Table 5- Department Elective courses

Course NO.		Course Title	Pre-requisite		C.H	Distribution		
Code	NO.					L	T	LB
SE	1010	Emerging Digital Technologies	--		2	2	0	0
CS	3101	Seminar in Undergraduate Advanced Research			٢	٢	0	0
SE	3111	Human Computer Interaction	SE2111		3	3	0	0
CS	4201	Soft Computing	CS3501		3	3	0	0
CS	4211	Simulation and Modeling	STAT 1050		3	2	1	0
CS	4221	Parallel Processing	CS3701		3	3	0	0
CS	4411	Information Retrieval Systems	IS2511		3	3	0	0
CS	4511	Natural Languages Processing	CS3501		3	3	0	0
CS	4531	Neural Networks	CS3501		3	3	0	0
SE	4541	Advanced Software Engineering	CS2111		3	3	0	0
CS	4561	Pattern Recognition	CS2311		3	3	0	0
CS	4601	Multimedia System Development	CS2311		3	3	0	0
CS	4621	Computer Vision	-		3	2	0	2
CS	4641	Computer Arabization	CS2311		3	2	0	2
CS	4731	Systems Programming & Administration	CS3701		3	2	0	2
CE	4740	Cloud Computing	CE3761		3	3	0	0
CS	4741	Computer System Performance	-		3	3	0	0
CE	4760	Mobile and Wireless Networking	CE3761		3	3	0	0
CE	4801	Robotics and Automation	CS3501		3	2	0	2
CS	4811	Cybercrime	CS3801		3	3	0	0
CS	4821	Cryptography	CS3801		3	3	0	0
CS	4831	Mobile Application Development	CE3761		3	2	0	2
CS	4851	Computer Networks Management	CE3761		3	3	0	0

CS	4861	Network Security	CE3761		3	2	0	2
CS	4871	Mobile Network Security	CS3801		3	3	0	0
CS	4881	Computer Forensics and Investigations	CS3801		3	2	0	2
CS	4891	Disaster Recovery Planning	CS3801		3	3	0	0
CS	4931	Special Topics in Computer Science	-		4	4	0	0
CS	4941	Related Issues in Computer Science	-		3	3	0	0
CS	4951	Professional Certificates	-		3	2	0	2
CS	4961	Advanced Database systems	IS2511		3	3	0	0
CS	4991	Research	-		3	3	0	0

Recommended Study Plan

Academic Year : First				Semester -1				
Course NO.		Course Title	Pre-requisite	C.H	Distribution			
Code	NO.				L	T	LB	
PHYS	1010	General physics(I)	---	٤	3	١	١	
MATH	1050	Differential calculus	---	3	٣	٢	0	
ENGL	1210	Reading Skills	---	٣	3	3	·	
ENGL	1220	Writing Skills	---	٣	3	3	·	
IC	101	Introduction of Islamic Culture	--	2	2	0	0	
Total				15	14	9	1	

Academic Year : First				Semester 2				
Course NO.		Course Title	Pre-requisite	C.H	Distribution			
Code	NO.				L	T	LB	
ARAB	101	Language Skills	--------	2	2	0	0	
ENGL	1230	Conversation and listening skills	---	٣	3	٣	·	
MATH	1060	Integral calculus	MATH1050	٣	٣	٢	·	
MC	1400	Communication Skills	---	2	2	0	0	
IT	1400	Computer Skills	---	3	2	0	2	
ENGL	1604	English for Technical Purposes	---	٣	٣	٣	·	
Total				16	15	8	2	

Academic Year : Second			Semester -3				
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB
CE	1111	Logic Design	---	3	3	1	0
CS	1112	Discrete Mathematics	---	٤	٤	.	.
CS	1301	Computer Programming 1	---	٤	٣	٢	.
MATH	2220	Linear Algebra for Computer Students	---	٣	٣	١	.
IC	102	The Islam and Society Building	---	٢	٢	0	0
Total				16	15	4	0

Academic Year : Second			Semester -4				
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB
PHYS	1040	General Physics(II)	PHYS1010 MATH1060	4	3	1	1
STAT	1050	Probability and Statistics for Computer Students	---	٣	٣	١	.
CS	2301	Computer Programming 2	CS 1301	٤	٣	٢	.
CE	2471	Computer Architecture and Assembly language	CE1111	٣	٢	.	2
IS	2511	Fundamentals of Database Systems	---	3	2	2	0
Total				17	13	6	3

Academic Year : Third			Semester -5				
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB
SE	2111	Fundamentals of Software Engineering	CS2301	3	3	0	0
CS	2311	Data Structures	CS2301	٤	٢	٢	.
MATH	2540	Numerical Methods	MATH2220	٣	٣	١	.
CE	3761	Computer Network Systems	CE2471	٣	٣	.	.
CS	3821	Web Application Programming	IS2511	3	2	0	2
IC	103	The Foundation of the Economic System in Islam	---	2	2	0	0

				C.H	L	T	LB
		Total		18	15	3	2

Academic Year : Third				Semester -6			
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB
ARAB	103	Arabic Editing	---	2	2	0	0
CS	3001	Computing ethics and research methods	At least ٧٠ C.H	٣	٣	.	.
CS	3401	Algorithm Design and Analysis	CS2311	٣	٣	.	.
CS	٣٥٠١	Artificial Intelligence		٣	٣	.	.
CS	3701	Operating Systems	--	3	3	0	0
CE	3791	Computer Network Systems Lab	CE3761	1	0	0	2
CS	3801	Fundamental of Cyber Security	IS2511	3	3	0	0
Total				18	17	0	2

Field Training between semester – 6 and semester – 7							
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB
CS	4901	Field Training	At least 74 C.H	3	0	0	0
Total				3	0	0	0

Academic Year : Fourth				Semester -7			
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB
CS	2401	Computation Theory	CS1112	3	3	1	0
CS	4311	Advanced Programming	Cs2301	٣	٢	٢	.
CS	4552	Machine Learning	CS3501	٣	٣	.	.
CS	4654	Digital Image Processing	CS3401	٣	٢	.	2
CS	4912	Graduation Project I	At least 80 C.H	3	3	0	0
CS	***	Elective course 1		3	3	0	0
Total				18	16	3	2

Academic Year : Fourth				Semester -8			
Course NO.		Course Title	Pre-requisite	C.H	Distribution		
Code	NO.				L	T	LB

CS	4321	Programming Languages & Compilers	--	4	3	1	0
CS	4841	Distributed Systems	CS3701	٣	٣	١	.
CS	4921	Graduation Project II	CS4912	٣	3	.	0
CS	***	Elective course 2		3	٣	.	0
CS	***	Elective course 3		3	٣	.	0
IC	**	Islamic elective course		2	٢	.	0
Total				18	17	2	0

Pre-Requisite Diagram
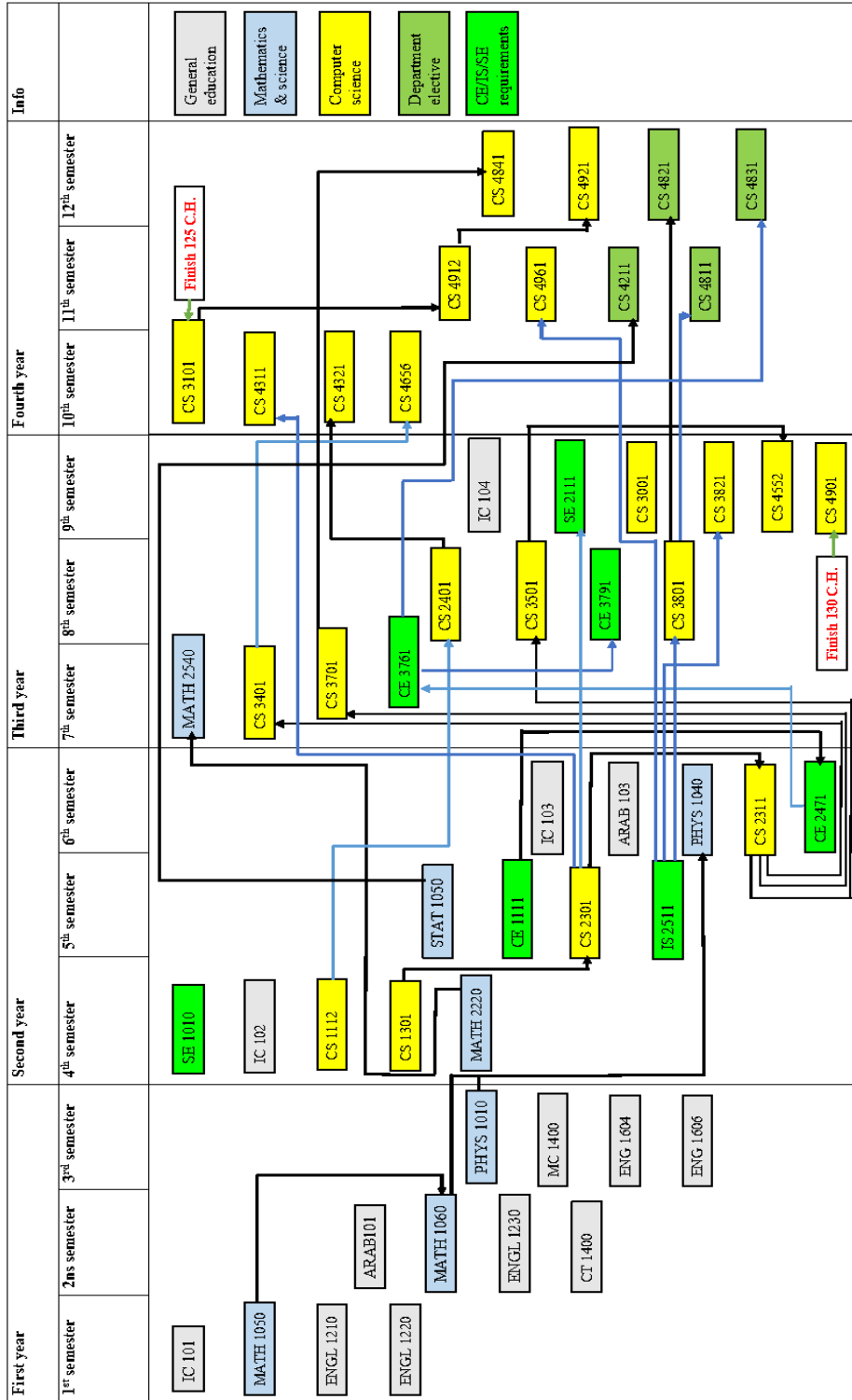
Course descriptions:

1. **Course Description/Computer Science**

   1.1 Mandatory Courses

Course No.	IT 1400	Course Name	Computer skills		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	----------------	Co-requisite	----------

This course serves as an introductory course for the engineering/computer/science colleges. It includes topics such as: introduction to computing and information technology; productivity skills: (word processing, spreadsheets, presentations, information, communications and networking); problem solving: (flow charts, introduction to algorithms, control structures); computer programming: (programming languages, compilers, Pseudo code examples).

At the end of this course, the students are expected to be familiar with the basics of computing and information technology. Also they will comprehend the principles of problem solving and algorithms by analysing problems and design suitable solutions. Moreover, they are expected to practice and master productivity skills.

Course No.	CS 1112	Course Name	Discrete Mathematics		
C.H Dist.	4 (4 + 0 + 0)	Pre-requisite	----------------	Co-requisite	----------

Introduces the foundations of discrete mathematics as they apply to computer science, focusing on providing a solid theoretical foundation for further work. Topics include introduction to: Basic logic: logic and proof techniques. Fundamental discrete structures: sets, relations, functions, Sequences and Summations. Growth of functions. Integers and Division, Rings & Fields, Applications of Number Theory. Basics of counting: Counting arguments, The pigeonhole principle, Permutations and combinations, Recurrence relations. Graphs and Trees. Discrete Probability.

Course No.	CS 1301	Course Name	Computer Programming 1		
C.H Dist.	4 (3 + 2 + 0)	Pre-requisite	----------------	Co-requisite	----------

Introduction to concepts, principles, and skills of programming including compilers, compiling process, algorithms, and introduction to problem-solving. Implementation of algorithms in a programming language. Fundamentals of programming concepts including data type assignment statements, standard input/output, selection, repetition, functions/methods, parameters, scope of identifiers, debugging. Data structures and algorithms include arrays (1D and 2D), characters strings, Linear search, binary search and simple sorting algorithm. Pointers (optional)

Course No.	CS 2301	Course Name	Computer Programming 2		
C.H Dist.	4 (3 + 2 + 0)	Pre-requisite	CS 1301	Co-requisite	----------

Introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. Topics include classes and objects, data members and member functions, constructors, garbage collector and finalize, overloading, inheritance, polymorphism, and templates and exceptions handling. Data structures such as linked lists, stacks and queues, and graphical user interface.

Course No.	CS 3001	Course Name	Computing Ethics and Research methods		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	At least 7 ·C.H	Co-requisite	----------

This course introduces students to the social and professional issues that arise in the context of computing. Topics include history of computing, social context, impact of computing on society, analytical tools, professional ethics, Governance and regulation, risks, security operations, intellectual property, privacy and civil liberties, computer crime, economics of computing, Professional responsibility, and philosophical frameworks

Course No.	CS 3701	Course Name	Operating Systems		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	---	Co-requisite	----------

This course aims to introduce the fundamentals of operating systems design and implementation. Topics include an overview of the modern operating systems, Types of operating systems, operating system structures, process management and thread (concepts of, communication, synchronization and deadlock), CPU scheduling, memory management and virtual memory, File systems; I/O systems; Security and protection.

Course No.	CS 2311	Course Name	Data Structures		
C.H Dist.	4 (2 + 2+ 0)	Pre-requisite	CS 2301	Co-requisite	----------

This course aims to introduce basic data structures and performance measurement of algorithms which are to be used as tools in designing solutions to problems. Topics include methods of analysis of algorithms including asymptotic notations and empirical measurements of performance, pointers and recursion, abstract data type concepts, different data structures including concepts, implementation and operations for maintaining them; such data structures are: lists and linked-lists, stacks, queues, priority queues, trees and its traversal, binary search trees, heaps, hash tables and graphs and graphs' algorithms. Also, important sorting and searching algorithms will be discussed including bubble sort, insertion sort, selection sort, merge sort, heap sort and radix sort, sequential search and binary search.

Course No.	CS 2401	Course Name	Computation Theory		

C.H Dist.	3 (3 + 1 + 0)	Pre-requisite	CS 1112	Co-requisite	----------

This course is an introduction to the theory of computational complexity and standard complexity classes. Topics include languages, finite and nondeterministic finite automata, Context-free grammar, Turing machines, computability, computational complexity, formal logic, and computational logic.

Course No.	CS 3401	Course Name	Algorithm Design and Analysis		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS2311	Co-requisite	----------

This course introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include correctness of algorithms, asymptotic notation, recurrences, and Master theorem, divide and conquer, transform and conquer (Balanced Trees), time-space trade-offs, median and order statistics, searching and sorting algorithms, dynamic programming, greedy algorithms, branch-and-bound, recursive backtracking, computational geometry, string matching. Optional material: NP-completeness, competitive analysis, amortized analysis, randomized algorithms, and approximation algorithms.

Course No.	CS 3501	Course Name	Artificial Intelligence		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS2311	Co-requisite	----------

Introduces students to the fundamental concepts and techniques of artificial intelligence. Topics include fundamental issues, agents, solving problems by searching, informed search and exploration, constraint satisfaction problems, knowledge representation and reasoning, advanced search, advanced knowledge representation and reasoning, planning, and uncertainty.

Course No.	CS 4654	Course Name	Digital Image Processing		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CS3401	Co-requisite	----------

This course covers the fundamentals of computer graphics and the techniques for digital image processing and analysis. Course topics include Computer graphics and Visualization (GV) , image sensing and acquisition, some basic gray level transformations for image enhancement, image contrast enhancement using histogram processing, image smoothing using spatial filters, image sharpening using spatial filters, point, line and edge detection, basic global and adaptive thresholding for image segmentation, optimal global and adaptive thresholding for image segmentation, region-based image segmentation and edge-based segmentation, image restoration in the presence of noise-spatial filtering, image enhancement

Course No.	CS 3801	Course Name	Fundamentals of Cyber Security		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CE3761	Co-requisite	----------

This course covers the major aspects of computer and network security. This module include : Model and attacks, security

services (confidentiality, integrity, non-repudiation, availability, accountability), Cryptography: symmetric-key and Asymmetric-key cryptography, authentication and digital signature, key management and cryptographic protocol, physical security, access control and authentication, building secure system, security in operating systems, security in computer networks, risk management and analysis, computer security policy, security administration, virus protection, International information security standards and Intrusion detection and incident response, Electronic mail security (PGP, MIME). Firewalls and web security. While the module does provide all the necessary mathematical background in cryptography, it concentrates more on the systems security aspects. Therefore, the primary focus will be on the design of computing systems from the security perspective.

Course No.	CS 3821	Course Name	Web Application programming		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	IS2511	Co-requisite	----------

This is an introductory course for web page design using client-side programming with HTML, CSS and JavaScript. JavaScript events are studied and used for HTML form validation. The xml is also introduced as a data representation language. Students will learn how client-server programming works in the internet environment and will be able to design web pages with dynamic effects. This course also is for teaching the concepts and programming techniques using a server-side programming language, a web server, and a database server. Students will learn a new server-side programming language (e.g., JSP, PHP or ASP.NET) and a database design tool, and will be able to deal with the database and web server to deploy applications including several web pages, a relational database as well as data represented by XML documents.

Course No.	CS 4311	Course Name	Advanced programming		
C.H Dist.	3 (2 + 2 + 0)	Pre-requisite	CS2301	C.H Dist.	3 (2 + 0 + 2)

Students should be able to move on to more advanced programming techniques after taking the first object-oriented programming course. Advanced Programming course is a comprehensive study of many advanced object-oriented topics. These include: Graphical User Interface (GUI) components, Event-driven programming (event-handling methods, event propagation, exception handling), Application Programming Interfaces (APIs), Layout managers, Graphics using 2D, Files and Streams, Applets, Multimedia, Threads, Networking with Sockets, and Java Database Connectivity (JDBC).

Course No.	CS 4321	Course Name	Programming Languages and Compiler		
C.H Dist.	4 (3 + 1 + 0)	Pre-requisite	--	Co-requisite	----------

This course gives an introduction to programming languages features and design issues and the methods used in compilers to translate high-level programming languages into machine code. This module include Programming language features and design issues; Data, operands and operators, expressions, statements, and subprograms, lexical analysis, syntax analysis, syntax-directed translation, type checking, run-time environments, intermediate code

generation, and code generation. The students are expected to write a complete compiler for a very simple high level programming language.

Course No.	CS 4901	Course Name	Field Training		
C.H Dist.	3 (3 +0 + 0)	Pre-requisite	At least 74 C.H	Co-requisite	----------

Field training is an important aspect of the educational process. Student is required join an IT center in a government or private sector as a full time for at least 8 weeks in summer. The aim of the student training is to acquire the experience in applying what he learned in real life and in team working. The student training is evaluated through both his training advisor at the IT center and the training committee through the report he provides about his training.

Course No.	CS 4912	Course Name	Graduation Project – 1		
C.H Dist.	3 (3 +0 + 0)	Pre-requisite	At least 80 C.H	Co-requisite	----------

The graduation project consists of two courses. In this course, student will initiate a project that meets career interests and program objectives. Student must be developing an integrated software system or offer a scientific solution for research problem in the form of algorithms; model; …; etc. One or more faculty will be available to each student in a consulting capacity. The department chair must approve an outline of the project in the semester prior to registration for this course.

Course No.	CS 4921	Course Name	Graduation Project – II		
C.H Dist.	3 (0 +0 + 3)	Pre-requisite	CS 4912	Co-requisite	----------

Student will complete the project that initiated in graduation project 1. In this course, the student is expected to deliver a detailed report including all the software development phases; the algorithms; or models. The student must be discussed in a seminar and in the presence of arbitrators.

Course No.	CS 4841	Course Name	Distributed Systems		
C.H Dist.	3 (3 +1 + 0)	Pre-requisite	CS 3701	Co-requisite	----------

This course extends the study of the design and implementation of operating systems to distributed and advanced computer systems. Topics include introduction to parallel and distributed computing systems and models, networking and internetworking essentials, overview of network programming, parallel and distributed computing technologies and middleware, distributed operating systems, parallel, distributed computing algorithms, databases, applications, and case study, and selected advanced topics.

Course No.	CS 4552	Course Name	Machine Learning		
C.H Dist.	3 (3 +0 + 0)	Pre-requisite	CS 3501	Co-requisite	----------

Definition and examples of machine learning, inductive learning, statistical based learning, reinforcement learning, supervised learning, unsupervised learning, learning decision trees, learning neural networks, learning belief networks, the nearest neighbor algorithm, learning theory, the problem of overfitting, clustering, and computational learning theory.

1.2 Elective Courses

Course No.	CS 3101	Course Name	Seminar in Undergraduate Advanced Research		
C.H Dist.	2 (2 + 0 + 0)	Pre-requisite	---	Co-requisite	----------

This course will prepare students for developing a research project in computer science by examining how to plan, conduct and report on empirical investigations. The course will cover techniques applicable to each of the steps of a research project, including formulating research questions, reviewing the literature, theory building, data analysis (using both qualitative and quantitative methods), building evidence and assessing validity.

Course No.	CS 4201	Course Name	Soft computing		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS 3501	Co-requisite	----------

This course introduces soft computing methods which, unlike hard computing, are tolerant of imprecision, uncertainty, and partial truth. This tolerance is exploited to achieve tractability, robustness, and low solution cost. The principal constituents of soft computing are fuzzy logic, neural network theory, and probabilistic reasoning. Topics include fuzzy sets, fuzzy reasoning, rule base structure identification, fuzzy diagnosis, fuzzy data fusion, gradient descent, genetic algorithms, case-based reasoning, automated collaborative filtering, hybrid systems, and Dempster-Shafer reasoning.

Course No.	CS 4211	Course Name	Simulation and Modeling		
C.H Dist.	3 (2+ 1 + 0)	Pre-requisite	STAT1050	Co-requisite	----------

Introduces students to the modeling and simulation of real-world processes and systems. Topics include concepts in Discrete Event Simulation (DES), components of DES, Monte Carlo simulation, the life cycle of a simulation study, input and output data analysis, world views and time control, random number generation, credibility assessment of simulation results, simulation languages, parallel and distributed simulation, applications of simulation using contemporary simulation modeling and support software.

Course No.	CS 4221	Course Name	Parallel Processing		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS3701	Co-requisite	----------

This course gives an introduction to high-performance computing through parallel processing demands the cooperation of algorithms, programming languages and architectures. The course will examine different parallel architectures, the languages used to program them with their communication and synchronization primitives, and the algorithms required to exploit parallelism in real applications. Topics: Parallel algorithms; parallel programming languages; processor architectures, memory systems, data and parallel decompositions, parallel architectures including vector processors, multiprocessors, multi-computers; routing topologies; shared memory and massage passing, interconnection networks, PRAM model (exclusive versus concurrent reads and writes) and sample applications.

Course No.	CS 4411	Course Name	Information Retrieval Systems		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	IS2511	Co-requisite	----------

The course presents an introduction to the field of information retrieval and discusses automated techniques to effectively handle and manage unstructured and semi-structured information. This includes methods and principles that are at the heart of various systems for information access, such as Web or enterprise search engines, categorization, and recommended systems, as well as information extraction and knowledge management tools.
Basic and advanced techniques for text-based information systems: efficient text indexing; Boolean and vector space retrieval models; evaluation and interface issues; Web search including crawling, link-based algorithms, and Web metadata; text/Web clustering, classification; text mining.

Course No.	CS 4511	Course Name	Natural Languages Processing		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS3501	Co-requisite	----------

This course will consider how methods of natural language processing can be used to bridge this gap: to extract information from text, and to answer a user's questions about text and data base information. Topics include language modeling, linguistics, words and lexicon, hidden Markov models, deterministic and stochastic grammar, parsing algorithms, corpus-based methods, information retrieval and information extraction, language translation, and speech recognition.

Course No.	CS 4531	Course Name	Neural Networks		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS3501	Co-requisite	----------

This course introduces the concepts of connectionism, along with algorithms for simulating neural networks, discussion of alternative network architectures and training algorithms. Topics include basic neuron models, neural network models, learning algorithms and applications.

Course No.	CS 4561	Course Name	Pattern Recognition		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS2311	Co-requisite	----------

Pattern recognition systems and components, Parallel and sequential recognition methods, scene analysis, syntactic pattern recognition, shape analysis and recognition. Covering theoretical foundations of classification and pattern recognition and discuss applications of pattern recognition: applications in character recognition - optical character recognition (OCR), speech and face recognition, and some applications in automation and robotics (industrial robot vision and medical diagnosis). Moreover, this course will include some topics such as: Bayesian decision theory, discriminate functions for normal class distribution, pattern estimation and supervised learning, nonparametric techniques linear discriminant functions and learning, unsupervised learning and clustering, neural networks including multilayer perceptron, stochastic algorithms (such as genetic algorithms)

Course No.	CS 4601	Course Name	Multimedia Systems Development		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS2311	Co-requisite	----------

To introduce students to multimedia systems development and multimedia object-oriented programming. Topics include multimedia authoring and production, multimedia development process, multimedia scripting, using lists and casts, storage and delivery technologies, global development issues, legal issues, intelligent multimedia systems, automated presentation planning systems, user modeling, designing 3D virtual environments, intelligent 3D illustration systems, automated generation of animated 3D explanations, computer-generated cinematography, and educational applications of intelligent multimedia systems.

Course No.	CS 4621	Course Name	Computer Vision		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	--	Co-requisite	----------

The goal of computer vision is to deduce the properties and structure of the three-dimensional world from one or more two-dimensional images. The understanding and practice of computer vision depends upon core concepts in computing, but also relates strongly to the disciplines of physics, mathematics, and psychology. Topics include image acquisition, the digital image and its properties, image preprocessing, segmentation, shape representation and object recognition, motion analysis, and case studies like object recognition and object tracking.

Course No.	CS 4641	Course Name	Computer Arabization		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CS2311	Co-requisite	----------

To use the Arabic language in the computer applications development and design. Topics include Arabic language features, Arabic language processing, Arabic characters, and fonts, viewing and printing Arabic text, Arabic text optical character recognition, scientific CS terminologies translation, Arabic speech generation, Arabization applications in operating systems, internet, and system Arabization level (screen Arabization, keyboard Arabization, printer Arabization, font and codepage manipulation, creating visual Arabic interfaces, etc.).

Course No.	CS 4731	Course Name	Systems Programming & Administration		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CS3701	Co-requisite	----------

This course provides experience with the administration and programming of some popular OS, e.g., Linux or MS Windows. Topics include basic shell commands and utilities, shell scripting and GUI tools for user management, file system management, management of security policies, network services and background processes, web-based administration tools for remote administration.

Course No.	CS 4741	Course Name	Computer Systems Performance		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	--	Co-requisite	----------

Concepts of performance. Concepts of performance Metric and Benchmark programs. Characteristics of good performance metric, summarizing data: averaging performance and variability. Quantifying errors in experiments. Comparing alternatives. Measurement tools and techniques. Introduction to simulation. Analytical models: introduction to queuing theory

Course No.	CS 4811	Course Name	Cyber crime		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS3801	Co-requisite	----------

This course introduces and explains the various types of offenses that qualify as cybercrime activity. Emphasis is placed on identifying cybercrime activity and the response to these problems from both the private and public domains. Topics include Types of computer crime, history, surveys, statistics and global connections; Legal Measures: Computer Misuse, Criminal Damage, Software Piracy, Forgery, Investigative Powers; computer crimes, namely malware (viruses, worms, Trojan Horses, etc.), email spamming and denial of service (DoS) attacks.

Course No.	CS 4821	Course Name	Cryptography		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS3801	Co-requisite	----------

Introduction to number theory: modular arithmetic, prime number, Fermat's and Euler's Theorems, Testing for Primality, Chinese Remainder Theorem, Integer Factorization, Discrete logarithms, Set algebra and finite fields. Computations in finite fields using standard and non-standard bases. High performance algorithms and architectures for cryptographic applications. Cryptographic algorithms: Classical cryptography; Secret Key Encryption; Perfect Secrecy. Cryptanalysis; Block and Stream cipher; Data Encryption Standard (DES) and Advanced Encryption Standard (AES); Public Key Encryption; Diffie-Hellman Key Exchange; RSA, ElGamal and Rabin's Cryptosystems; Authentication and Digital Signatures; One-time signatures; Randomized Encryption; Rabin and ElGamal signature schemes; Digital Signature Standard (DSS)' Cryptographically. Identification and entity authentication. Hash algorithms, Message Authentication Codes. Key establishment protocols. Key management Techniques.

Course No.	CS 4831	Course Name	Mobile Application Development		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CE3761	Co-requisite	----------

The objective of this course is to learn about mobile computing and mobile application development. Mobile computing will be discussed from several perspectives: mobile technology, application development, and user interaction. Topics include quick view for the Mobile Technology-Mobile network architecture, Generations of mobile networks (GSM, UMTS, and LTE). Application development for mobile devices differs significantly from desktop development and in this course, you will learn hands-on about mobile development environments, different mobile platforms, and operating systems (iPhone, Android, Symbian/S60, Web OS, Windows Mobile, BlackBerry OS, BREW, JavaME/JavaFX, Flashlight), and the specific constraints and requirements of user interface design for limited devices and mobile application development. The course combines a conceptual overview, design issues, and practical development issues.

Course No.	CS 4851	Course Name	Computer Networks Management		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CE3761	Co-requisite	----------

This course provides overview of network design and management; Design methodologies; Network management strategies; Network configuration management; Network management protocols: SNMP, SMIC, RMON, etc.; Network management tools and systems; Network management applications; Desktop and web-based network management; Network troubleshooting.

Course No.	CS 4861	Course Name	Network Security		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CE3761	Co-requisite	----------

Introduction to Networking and Network Security, including perimeter security defenses, firewalls, virtual private networks, intrusion detection systems and related network security technologies; E-mail Security. Secure network applications. Introduction to Secure Protocols; Secure Protocols – IPsec, SSL/TLS and SSH; Kerberos. Network threats and countermeasures

Course No.	CS 4871	Course Name	Mobile Network Security		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	CS3801	Co-requisite	----------

Mobile devices continue to evolve and penetrate our everyday lives, leading to increased importance of mobile security - a topic living in the intersection of wireless communication, mobile computing, and computer security. This course focuses on aspects of information and network security that arise in this challenging and ever-evolving space of mobile communication systems, including mobile/cellular telephony, wireless Internet, and mobile ad hoc and sensor networks. Possible topics of study include (but are not limited

to) telecom vulnerabilities; smart phone security; mobile Internet security; mobile location privacy; and ad hoc, sensor network security, authentication protocols/algorithms, vulnerabilities, attacks and security services; confidentiality, Privacy, Integrity, Spoofing signal Intercept, Key management and distribution and control of fraudulent usage of networks.

Course No.	CS 4881	Course Name	Computer Forensic & Investigation		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite	CS3801	Co-requisite	----------

Computer Forensics and Investigation presents methods to properly conduct a computer forensics investigation beginning with a discussion of ethics, while mapping to the defined objectives. This course will provide overview of methods and tools utilized for collecting and preserving electronic digital evidence for computer forensic process. Topics include the forensic examination, analysis and report writing; and preparing for courtroom testimony about the forensic results. Course includes significant hands-on-exercises, case studies and culminates with a mock trial exercise in which each student will present testimony as an expert witness

Course No.	CS 4891	Course Name	Disaster Recovery Planning		
C.H Dist.	3 (3+ 0 + 0)	Pre-requisite	CS3801	Co-requisite	----------

The goal of this course is to expose students to the essentials of disaster recovery planning. Coverage includes disaster recovery process containing the process of assessing risks that an organization faces, and then developing, documenting, implementing, testing, and maintaining procedures that help the organization quickly return to normal operations and minimize losses after a disaster. With focusing on information services systems.

Course No.	CS 4931	Course Name	Special Topics in Computer Science		
C.H Dist.	4 (4 + 0 + 0)	Pre-requisite	CS3801	Co-requisite	----

A series of advanced topics in areas of computer science is offered. The course details a structured discussion of varied subjects to include technological updates related to a specific track, a more intense study of topics covered in other course offerings, and an introduction to advanced concepts.

Course No.	CS 4941	Course Name	Related Issues in Computer Science		
C.H Dist.	3 (3+ 0 + 0)	Pre-requisite	--	Co-requisite	----------

Original investigation of special problems selected by the student in consultation with the instructor and with the

permission of the Chairperson of the Computer Science Department.

Course No.	CS 4951	Course Name	Professional Certificates		
C.H Dist.	3 (2 + 0 + 1)	Pre-requisite		Co-requisite	----------

This course aims to qualify students to the market by linking higher education to the industrial needs. This course is designed to help students to improve and maintain their professional skills in several field of computing such as: Operating Systems, Database Systems, Networking, and others. The final goal of this course is to fully prepare students for getting an approved intentional certificate from an international company to meet competency and skill requirements for specified profession in computer and information technology. Original investigation of special problems selected by the student in consultation with the instructor and with the permission of the Chairperson of the Computer Science Department.

Course No.	CS 4961	Course Name	Advanced Database Systems		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite	IS2511	Co-requisite	----------

Students should be able to move on to more advanced database topics after taking the first "Fundamentals of Database Systems" course. Advanced Database course is a study of many advanced data models such as: object-oriented model: object-relational model. Parallel and distributed database. Transaction ACID properties and concurrency control. Database backup and recovery. Query processing and optimization. Homogeneous and heterogeneous solution based on XML. By the end of this course the students should have an adequate understanding on temporal Database, Intelligent Database, query optimization and data warehouse. The topics that are covered in this course help the student to be more skilful in managing normal, distributed, light and huge queries. This will prove the students' skills progress further in Computer Science.

Course No.	CS 4991	Course Name	Research		
C.H Dist.	3 (3 + 0 + 0)	Pre-requisite		Co-requisite	----------

This course provides the basic skills needed for research in computer science, including a survey of the various research paradigms, experimental protocols used across the field, oral presentation skills, report writing skills, comprehension, critiquing and feedback skills, teamwork skills, and research skills such as formulating a problem, interpret the results of an experiment, planning research efforts, and managing time.

Courses offered by Computer Engineering department

Mandatory Courses offered by Computer Engineering department

Course No.	CE1111	Course Name	Logic Design		
C.H Dist.	3 (3 +1 + 0)	Pre-requisite		Co-requisite	----------
History and overview, Numbers and conversions, Switching theory, Boolean Algebra, Combinational logic circuits, Function Optimization, Modular design of combinational circuits, Memory elements, Sequential logic circuits, Finite State Machines (FSMs) models, state diagrams, state tables, state reduction and state assignment.					

Course No.	CE 2471	Course Name	Computer Architecture and Assembly Language		
C.H Dist.	3 (2+0 + 1)	Pre-requisite	CE 1111	Co-requisite	----------
Computer organization; assembly language: addressing modes, stacks, argument passing, arithmetic operations, decisions, performance metrics, instruction set design, instruction formats, control unit design, hardwired control, micro programmed control, instruction cycle, pipeline design techniques , memory hierarchy; cache memory and virtual memory, I/O fundamentals (handshaking and buffering) and Interrupt mechanisms, Buses (protocol arbitration, direct-memory access), super-scalar architecture, parallel architectures					

Course No.	CE 3761	Course Name	Computer Network systems		
C.H Dist.	3 (3+0 + 0)	Pre-requisite	CE 2471	Co-requisite	----------
This course provides an introduction to communication and computer networks and : connectivity, network topologies, analog and digital transmission, modulation and demodulation, transmission media, data encoding, synchronous and asynchronous transmission, digital carriers, access methods and multiplexing, circuit and packet switching, OSI model: (DNS, SMPT, FTP, WWW, socket programming communication protocols, TCP and UDP, Congestion control, Internetworking, addressing and routing algorithms and protocols, framing, flow and error algorithms, PPP, MAC), local area networks; internetworking devices; high-speed bridged networks; wide area networks; Internet and TCP/IP, Client-server architecture.					

Course No.	CE 3791	Course Name	Computer Network systems Lab		
C.H Dist.	1 (0+0 + 1)	Pre-requisite	CE 3761	Co-requisite	----------
Familiarizes the students with network equipment, wiring, architecture, and configuration. A set of experiments to design, apply, analyze, and evaluate communication network protocols. Students should employ their knowledge from previous courses to identify a problem, propose alternative solutions, implement a prototype using available network protocols, and evaluate the results. At the end of the course, students should be able to handle small to medium size networks and have ability to implement and troubleshoot different network issues related to routing and switching and a final project is given that will be evaluated at the end of the laboratory.					

Course No.	CE 4740	Course Name	Cloud Computing		
C.H Dist.	3(3+0 + 0)	Pre-requisite	CE 3761	Co-requisite	----------
Principles of Cloud Computing; Cloud Computing Architecture; Cloud Computing Characteristics; Different Cloud Computing Layers; Cloud Computing Service Layers; Virtualization; Cloud Computing Sourcing; Cloud Computing Storage; Utility Computing; Opportunities and Challenges; Advantages of Cloud Computing; Problems of Cloud Computing.					

Course No.	CE 4761	Course Name	Mobile and Wirelesss Networks		
C.H Dist.	3(3+0 + 0)	Pre-requisite	CE 3761	Co-requisite	----------
Principles, technologies, protocols and standards of wireless RF communication, with emphasis on wireless LAN (WLAN), WAN (WWAN) and personal area network (WPAN). The course contents include physical layer standards, medium access control, building and securing WLAN, Wide Area Networks including cellular networks and cellular data networks. Topics include: Wireless technologies and protocols Ad-Hoc versus structured networks, Bluetooth and Wifi networks, wireless LAN standards; IEEE 802.11/a,b,g,n standard, broadband wireless networks, IP Mobile networks, Wimax, GSM, GPRS, UMTS, LTE, Quality service guarantees-reliability and security in mobile computing environment, and mobility management					

Course No.	CE 4801	Course Name	Robotics & Automation		
C.H Dist.	3(2+0 + 1)	Pre-requisite	CE 3501	Co-requisite	----------
Basic concepts underlying the design and application of computer controlled manipulators; manipulator geometry; work volume; sensors; feedback control of manipulator linkages; kinematics; trajectory planning; programming; robot system architecture; design and application, programmable logic controllers					

Courses offered by Information System department
Mandatory Courses offered by Information System department

Course No.	IS 2511	Course Name	Fundamentals of Database systems		
C.H Dist.	3 (2 + 2 + 0)	Pre-requisite	---	Co-requisite	----------
This is an introductory course for web page design using client-side programming with HTML, CSS and JavaScript. JavaScript events are studied and used for HTML form validation. The xml is also introduced as a data representation language. Students will learn how client-server programming works in the internet environment and will be able to design web pages with dynamic effects. This course also is for teaching the concepts and programming techniques using a server-side programming language, a web server, and a database server. Students will learn a new server-side programming language (e.g., JSP, PHP or ASP.NET) and a database design tool, and will be able to deal with the database and web server to deploy applications including several web pages, a relational database as well as data represented by XML documents.					

Courses offered by Software Engineering department

Mandatory Courses offered by Software Engineering department

Course No.	SE 2111	Course Name	Fundamentals of Software Engineering		
C.H Dist.	3 (3+0 + 0)	Pre-requisite	CS2301	Co-requisite	----------

Principles of software engineering: basic understanding of software life cycle Requirements, design and testing. Review of principles of object orientation. Object oriented analysis using UML. Frameworks and APIs., basic modeling and design; basic of project management, software cost estimation, configuration management, and testing.

Elective Courses offered by Software Engineering department

Course No.	SE 1010	Course Name	Emerging Digital Technologies		
C.H Dist.	2 (2+0 + 0)	Pre-requisite	--	Co-requisite	----------

Technology advancements have profound impact in all walks of life. Globally, it is of strategic importance to develop the next generation leaders so that they are well informed about the latest technological trends and equipped with a rich understanding about their applications in different industry sectors as well as their societal benefits and potential pitfalls. This interdisciplinary course is intended to equip students with a critical understanding of emerging digital technologies and their impact on individuals, business, and society. Upon the successful completion of this course, students will be able to:

1. Analyze the latest digital technologies and corresponding trends, applications, and disruptive impacts.
2. Explain how different stakeholders assess the economic, environmental, and social impact of digital technologies.
3. Evaluate opportunities for technology-enabled transformations at individual, business, and societal scales.
4. Combine technologies to plan technology-enabled transformations.
5. Develop sound arguments for the deployment of new digital technologies.

Course No.	SE 3111	Course Name	Human Computer Interaction		
C.H Dist.	3 (3+0 + 0)	Pre-requisite	SE 2111	Co-requisite	----------

Psychological principles of human-computer interaction. Evaluation of user interfaces. Usability engineering. Task analysis, user-centered design, and prototyping. Conceptual models and metaphors. Software design rationale. Design of windows, menus, and commands. Voice and natural language I/O. Response time and feedback. Color, icons, and sound. Internationalization and localization. User interface architectures and APIs. Case studies and project.

Course No.	SE 4541	Course Name	Advanced Software Engineering		
C.H Dist.	3 (3+0 + 0)	Pre-requisite	SE 2111	Co-requisite	----------

Design patterns - Distributed systems architecture - Real-time software design – Data acquisition systems – Data processing systems – Transaction processing systems – Event processing systems

Course No.	MATH 1050	Course Name	Differential Calculus		
C.H Dist.	3 (3+2+ 0)	Pre-requisite	--	Co-requisite	----------

Course Description:

Real numbers, polynomials , Functions, Limits and Continuity: Algebraic Functions – Exponential Functions – Logarithmic Functions – Trigonometric Functions – Limits – Continuity. Derivatives: Techniques of Differentiation – Derivatives of Algebraic Functions – Derivatives of Exponential Functions – Derivatives of Logarithmic Functions – Derivatives of Trigonometric Functions – Equations of the Tangent and Normal – The Chain Rule – Inverse Trigonometric Functions – Hyperbolic Function and Inverse Hyperbolic Functions – Inverse Trigonometric Functions – Derivatives of Inverse Trigonometric Functions – Derivatives of Hyperbolic Functions – Inverse Hyperbolic Functions – Derivatives of Inverse Hyperbolic Functions- Calculation of the nth Derivatives – Differentiation of a composite Functions – Differentiation of Implicit Functions

Applications to Calculus: Function graph – Rolle's Theorem- mean value theorem - Differentials L'Hospital Theorem - maxima and minim- Related Rates -horizontal and vertical asymptotes.

Course No.	MATH 1060	Course Name	Integral Calculus		
C.H Dist.	3 (3+2+ 0)	Pre-requisite	MATH 1050	Co-requisite	----------

Course Description

Integration: Indefinite Integrals – Techniques of Integration: Trigonometric Integrals – Integration by Inverse Substitution – Completing the Square – Partial Fractions – Integration by Parts – Reduction Formulas – Definite Integrals – Arc length – Surface Area- Areas between Curves -Volumes of Revolution– Numerical Integration - Parametric Equations —– Polar Coordinates – Area in Polar Coordinates - Indeterminate Forms – Improper Integrals

Course No.	MATH 2220	Course Name	Linear Algebra for Computer Students		
C.H Dist.	3 (3+1+ 0)	Pre-requisite	--	Co-requisite	----------

Course Description

Matrix Definition – Matrix Operations – Symmetric Matrices – Transpose and Inverse of a Matrix – Hermitian Matrices – Markov Matrices – Factorization – Positive Definite Matrix – Row Operations – Row Reduced Echelon Form – Linear system of Equations – Solving Equation of the form $Ax = 0$ and $Ax = b$.

Vector Spaces and Subspaces – Basis and Dimension – Orthogonality – Similar Matrices – Singular Value Decomposition – Least Squares Approximations – Determinants – Properties of Determinants – Applications of Determinants – Cramer's Rule – Gauss Elimination Rule – Gauss Jordan Elimination – Eigenvalues and Eigenvectors – Diagonalization – Linear Transformation – Matrices with MATLAB.

Course No.	MATH 2540	Course Name	Numerical Methods		
C.H Dist.	3 (3+1+ 0)	Pre-requisite	MATH 2220	Co-requisite	----------

Course Description

Linear and Quadratic Equations - Functions of a Single Variable - Solution of Systems of Linear Equations - Solution of Linear Systems by Elimination - Elementary Introduction to Linear Programming - Convex Sets - Maxima and Minima of

Linear Functions - Problems of Maximizing or Minimizing a Linear Function to Linear Contraints - Linear Programming Problems - Numerical Solution of Differential Equations - Mathematical Preliminaries - Simple Difference Equations - Euler Method - Runge-Kutta Methods - Systems of Linear Equations – Introduction - Properties of Matrices - Diagonal and Triangular Matrices - Numerical Solution of Linear systems - The Pivoting Strategy - Introduction, Properties and the Numerical Methods.

Course No.	Stat 1050	**Course Name**	Probability and Statistics for Computer Students		
C.H Dist.	**3 (3+1+ 0)**	**Pre-requisite**	--	**Co-requisite**	----------

Descriptive statistics, statistical data classification, measures of central tendency, measures of dispersion. Basic probability concepts, conditional probability, Bayes law, random variable and probability distribution. Some discrete distributions, some continuous distributions and its applications. Sampling distribution of the mean, central limit theorem, estimation of the population mean and proportion, testing hypotheses about population mean and proportion. Course must focus on applications in the field of computer engineering and sciences.

Course No.	PHY 1010	**Course Name**	General Physics-1		
C.H Dist.	**4 (3+1+ 1)**	**Pre-requisite**	--	**Co-requisite**	----------

Course Description
HEAT: Thermal Basics: Temperature - Temperature Scales and Thermometers. Thermal Concept: Units of thermal energy - Heat capacity and Specific Heat - Newton's law of cooling - Specific heat of gases. Heat Transfer: Thermal conduction - Prevost's theory of heat change - Energy distribution of Black body radiation - Stefan's law - Wien's law - Thermal Expansion of Solids and Liquids. Latent Heat. **PROPERTIES OF MATTER:** Units and Dimensions - Physical Dimensional analysis - Estimates and order-of-magnitude calculations. Elasticity: Elasticity modulus - Fluid static's: Density and relative density – Pressure - Pascal's principal - Archimedes's Principle - Law of floatation - Relative density measurement. Fluid dynamics: Continuity equation - Bernoulli's Equation – application - Venturi tube - Piotot tube. Surface tension: Molecular theory of surface tension - Surface energy - Surface tension and spherical shape - Contact angle - Capillarity**.**
SOUND: Circular motion – Types of sound waves - Speed of Sound Waves.- Periodic Sound Waves.-Intensity of Periodic Sound Waves - Spherical and plane sound waves -The Doppler Effect - Digital Sound Recording - Motion Picture Sound.
Experimental part: Measuring tools – Hooke's law – Simple pendulum – Free falling – speed of sound - Vectors – Viscosity coefficient- Boyle's law – Archimede's principle – Newton's law of cooling – Specific heat capacity of solid and liquid.

Course No.	PHY 1040	**Course Name**	General Physics-II		
C.H Dist.	**4 (3+1+ 2)**	**Pre-requisite**	PHY1010	**Co-requisite**	----------

Course Description
This course includes **Electricity and Magnetism**: Coulomb's law, electric field, Gauss's law, electric potential, potential energy, capacitors and insulators, current and resistance, electrical energy and power, direct current circuits, Kirchhoff's law, magnetic fields, movement of charge in a magnetic field, sources of magnetic fields, Ampere's law, Faraday's law of induction, self-inductance, energy in a magnetic field, mutual inductance, alternating current, effective values, impedance, resonance, power Nuclear physics: photoelectric phenomenon, atomic spectrum, Bohr's model, structure of the nucleus, radioactivity, half-life, and Radioactive decay rate.