Curriculum

Programmes: B.Sc in Computer Science and Engineering

Department of Computer Science & Engineering

Metropolitan University

Bangladesh

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Chapter 1: Introduction

1.1 About the University

A globally praised integrated academic and research institution that creates a cheerful community of intellectuals is a must for the nation in today's world. Being a member of the global village, Bangladesh has been looking for the creation of graduates endowed with moral strength, creativity, competence, and commitment. Taking into account those goals, an eminent social worker and education promising personality Dr. Taufique Rahman Chowdhury came forward and established Metropolitan University in 2003 with the approval of the Ministry of Education under private university act 1992.

This is a social commitment of Metropolitan University Sylhet mainly to our nation for promoting better education to meet the changing needs of the globe in the 21st century. The university has been serving the citizens of the country to generate a community who can manage continuity and change through its instruction, research, and outreach programs.

1.2 Vision of the University

Our vision is to emerge as a preeminent teaching and researching university recognized around the globe through innovative education, creation and application of knowledge, and community engagement. We thrive on building an able and patriotic nation and we aspire to create a just and equal humane society for the generations to come.

1.3 Mission of the University

Our mission is to provide our prospective and current students with globally compatible tertiary education characterized by academic excellence in a range of subjects pertinent to the present and future social needs. In addition to academic requirements, we teach our students necessary lessons on moral values, ethics, manner & etiquette, self-respect, dignity, and patriotism, which together enable them to become eligible 21st Century citizens. We host a diverse, animated, and stimulating learning environment in which our students can realistically prepare themselves for pursuing their academic, personal, and career goals. By creating new insights through research and by sharing what we learn, we contribute to making the world a better place.

1.4 About the Department

The Department of Computer Science and Engineering started its journey in 2003 with the name Department of Information and Communication Technology, offering the program BSc in Computer and Information Science and a few numbers of undergraduate students. But the mission, vision and creative activities of the University authority and teachers pushed this department into its current position named Computer Science and Engineering. The department is enriched with sufficient equipment, laboratories and a good number of well-qualified 26 full-time permanent faculty members.

1.5 Vision of the Department

To be at the forefront of educational innovation, and drive the scientific and economic development of the nation and the world, by contributing research and adept professionals to the industry through education.

1.6 Mission of the Department

1. To produce graduates thoroughly conversant with the principles of modern computing science, who are able to apply those principles in the design and construction of reliable systems.
2. To offer programmes that concentrate on bridging theory and practice, including a wide variety of hardware and software technologies and their applications.
3. To equip students with the fundamental understanding and practical skills needed by the potential leaders of a demanding profession.

1.7 About the Programme

The B.Sc. Engineering (CSE) program is a 48 (forty-eight)-month study of 12 semesters for regular students. A student should complete at least 150credits to be a graduate. The program is intended for students who want to obtain a sound theoretical and technical knowledge in Computer Science. The job market in computer Science and Information Technology is robust and growing in a geometric profession in Bangladesh and throughout the world.

1.8 Entry Requirements for the B.Sc. Programme

CSE department is under the School of Science & Technology of the University. In each semester entry requirements have been considered for admission to the department of CSE. The students who passed Higher Secondary level or equivalent, any of them may apply for admission to undergraduate level if he fulfills the following requirements:

a) A student who passed SSC & HSC from Science group or equivalent public examinations with a minimum of GPA 2.5 (on a scale of 5.00) in each may apply for admission to the undergraduate programs.
b) Students who have a minimum of GPA 2.00 in either SSC and or HSC but a total of GPA 6.00 can apply.
c) For the students of ‘A’ level, at least 5 subjects with minimum GPA 2.5 in ‘O’ level and 2 subjects in ‘A’ level with GPA 2.5 are also eligible to apply.
d) Students must have a background in Physics and Mathematics.

The eligible candidates for admission have to sit for admission test and the number of students varies from semester to semester. The students can apply for admission to any one of three semesters Spring, Summer and Autumn. Generally, maximum students apply for Spring semester. Admission test arranged by the Central administration of the University following the procedure is as follows:

a) After verification of students’ documents, eligible candidates are allowed to sit for the admission test. The questions are of multiple choices in the subject of Physics, Mathematics, ICT, and English.
b) The duration of the test is one hour.
c) A merit list is prepared on the basis of marks obtained out of total marks or in a specific subject.

d) The students qualified in admission test and selected, the admission section of the office of the Registrar preserves the students' information through MUERP software verifying all of the documents and the students then get admission to the first semester.

Chapter 2: Curriculum Structure

2.1 Programme Objectives

The B.Sc. programme have the following objectives:

1. To disseminate knowledge regarding computing science and information technology.
2. To help students identify, formulate, and solve computing problems.
3. To create skilled software developers and testers who can thrive in the industry.
4. To enable the formation of multidisciplinary teams that can take on challenging tasks.
5. To provide the understanding of the necessary tools and techniques for electronic storage, management, and analysis of data.
6. To facilitate original research and development that help expand the boundaries of human knowledge.
7. To instill morals and values about the uses and abuses of technology.
8. To arm the students with knowledge of contemporary technology and methods.
9. To ensure learning and skill growth.

2.2 Intended Learning Outcomes

After graduation, students will get the fundamental concepts of computer science and engineering. They will be able to identify computational problems and devise algorithmic solutions. They will be able to build software that can be employed to solve real-world problems with economic, environmental, social, political, health and safety, manufacturability, and sustainability constraints. Besides, they will achieve communication and managerial skills.

2.3 Mapping between Programme Objectives and Intended Learning Outcomes

	Program Objectives	**Program Learning Outcomes**
1.	To disseminate knowledge regarding computing science and information technology.	Students will be able to grasp the fundamental concepts in computer science and engineering.
2.	To help students identify, formulate, and solve computing problems.	Students will be able to identify computational problems and devise algorithmic solutions.
3.	To create skilled software developers and testers who can thrive in the industry.	Students will be able to build software that can be employed to solve real-world problems with economic, environmental, social, political, health and safety, manufacturability, and sustainability constraints.
4.	To enable the formation of multidisciplinary teams that can take on challenging tasks.	Students will gain the aptitude to communicate and collaborate effectively with multidisciplinary teams in large-scale and complex projects.

5.	To provide an understanding of the necessary tools and techniques for electronic storage, management and analysis of data.	Students will be able to conduct computational experiments for analyzing and interpreting data.
6.	To facilitate original research and development that help expand the boundaries of human knowledge.	Students will be able to engage themselves in original research and contribute to the advancements in the field of Computer Science and Engineering.
7.	To install morals and values about the uses and abuses of technology.	Students will be able to act according to their professional and ethical responsibility.
8.	To arm the students with knowledge of contemporary technology and methods.	Students will be able to utilize modern computing languages, platforms and tools necessary for engineering practice.
9.	To ensure learning and skill growth.	Students will be able to engage in lifelong learning and self-development

2.4 Credit Distribution

Credits are used as the metric of course hours per week. The credit distribution of the B.Sc. programme is given below:

Credit Distribution of B.Sc. in Computer Science and Engineering	
Course Type	**Credits**
Core and Optional Courses	99
Science and Mathematics Courses	24
General Education Courses	21
Final Year Project and Viva (Capstone)	6
Total	**150**

2.5 Course List

	Code	Course Title	Prerequisite Courses
1	CSE 111	Computer Technology	
2	CSE 121	Structured Programming	CSE 111
3	CSE 122	Structured Programming Lab	
4	CSE 123	Basic Electrical Engineering	
5	CSE 124	Basic Electrical Engineering Lab	
6	CSE 125	Discrete Mathematics	
7	CSE 131	Basic Electronics Engineering	

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	Code	Course Title	Prerequisite Courses
8	CSE 132	Basic Electronics Engineering Lab	
9	CSE 133	Data Structure	CSE 121
10	CSE 134	Data Structure Lab	CSE 122
11	CSE 200	Project	CSE 121. CSE133
12	CSE 211	Digital logic Design	CSE 111, CSE 123, CSE 131
13	CSE 212	Digital logic Design Lab	
14	CSE 213	Computer Organization and Architecture	CSE 121
15	CSE 215	Telecommunication Principles	
16	CSE 221	Object Oriented Programming	CSE 121
17	CSE 222	Object Oriented Programming Lab	
18	CSE 223	Database Management System	
19	CSE 224	Database Management System Lab	
20	CSE 231	Algorithm	CSE 121, CSE 133
21	CSE 232	Algorithm Lab	
22	CSE 235	Microprocessor & Assembly Language	CSE 213
23	CSE 236	Microprocessor & Assembly L. Lab	
24	CSE 300	Project	
25	CSE 311	Computer Networks	
26	CSE 312	Computer Networks Lab	
27	CSE 315	Computer Peripherals & Interfacing	CSE 235
28	CSE 316	Computer Peripherals & Interfacing Lab	
29	CSE 321	Operating System	
30	CSE 322	Operating System Lab	
31	CSE 323	Web Programming	CSE 215, CSE 221, CSE 223
32	CSE 324	Web Programming Lab	
33	CSE 327	Theory of Computation	
34	CSE 415	Compiler Construction	CSE 327
35	CSE 416	Compiler Construction Lab	
36	CSE 421	Artificial Intelligence	

	Code	Course Title	Prerequisite Courses
37	CSE 422	Artificial Intelligence Lab	
38	CSE 423	Software Engineering	CSE 221
39	CSE 426	Final Year Project (Compulsory)	
40	CSE 436	Final Year Project (Compulsory)	
Science & Mathematics Courses			
41	MAT 112	Differential and Integral Calculus	
42	MAT 123	Differential Equations & Laplace Transform.	MAT 112
43	MAT 135	Matrices, Complex Variables and Fourier Analysis	MAT 112
44	MAT 216	Coordinate Geometry & Vector Analysis	
45	MAT 235	Numerical Methods	MAT 123, MAT 135
46	STA 215	Basic Statistics & Probability	MAT 112
47	PHY 111	Physics I	
48	PHY 124	Physics II	PHY 111
General Education			
49	ENG 114	Communicative English Language - I	
50	ENG 115	Communicative English Language - II	ENG 115
51	GED 129	Functional Bangla	
52	GED 219	Engineering Economics	
53	GED 233	Bangladesh Studies	
54	GED 321	Accounting	
55	GED 421	Industrial Management	
56	GED 431	Business Communication	
Optional Courses:			
57	CSE 331	Computer Graphics and Multimedia	
58	CSE 332	Computer Graphics and Multimedia Lab	
59	CSE 413	Optical Communication	
60	CSE 414	Optical Communication Lab.	
61	CSE 425	Neural Network	
62	CSE 426	Neural Network Lab	
63	CSE 431	VLSI Design	

	Code	Course Title	Prerequisite Courses
64	CSE 432	VLSI Design Lab	
65	CSE 441	Digital Signal Processing	MAT 123, MAT 135
66	CSE 442	Digital Signal Processing Lab	
67	CSE 443	Natural Language Processing	
68	CSE 444	Natural Language Processing Lab	
69	CSE 457	Parallel Processing	
70	CSE 458	Parallel Processing Lab	
71	CSE 461	Distributed System	
72	CSE 462	Distributed System Lab	
73	CSE 463	Advanced Database System	
74	CSE 464	Advanced Database System Lab	
75	CSE 465	Digital Image Processing	
76	CSE 466	Digital Image Processing Lab	
77	CSE 469	Bioinformatics Computing	CSE 231
78	CSE 470	Bioinformatics Computing Lab	
79	CSE 471	Machine Learning	
80	CSE 472	Machine Learning Lab	

2.6 Curriculum Alignment/Skill Mapping

Curriculum alignment is a formal process of evaluation of an individual program or a course to address the student's changing need. It is an academic term meaning the academic standards, instructional materials of the programs, teaching techniques and assessments contribute to the development of desired skills and qualities in the graduates. Curriculum alignment can also help to modify programs to better target future post-graduate success making better use of under-graduate level resources.

2.7 Mapping between Programme Objectives and Courses

Each course contributes to one or more programme objective.

	Code	Course Title	Programme Objectives								
			1	2	3	4	5	6	7	8	9
1	CSE 111	Computer Technology	✓								
2	CSE 121	Structured Programming		✓							
3	CSE 122	Structured Programming Lab		✓							

	Code	Course Title	Programme Objectives								
			1	2	3	4	5	6	7	8	9
4	CSE 123	Basic Electrical Engineering					✓				
5	CSE 124	Basic Electrical Engineering Lab					✓				
6	CSE 125	Discrete Mathematics		✓							
7	CSE 131	Basic Electronics Engineering					✓				
8	CSE 132	Basic Electronics Engineering Lab					✓				
9	CSE 133	Data Structure		✓							
10	CSE 134	Data Structure Lab		✓							
11	CSE 200	Project		✓		✓					
12	CSE 211	Digital logic Design					✓				
13	CSE 212	Digital logic Design Lab					✓				
14	CSE 213	Computer Organization and Architecture					✓				
15	CSE 215	Telecommunication Principles	✓								
16	CSE 221	Object Oriented Programming		✓							
17	CSE 222	Object Oriented Programming Lab		✓							
18	CSE 223	Database Management System			✓		✓				
19	CSE 224	Database Management System Lab			✓		✓				
20	CSE 231	Algorithm		✓							
21	CSE 232	Algorithm Lab		✓							
22	CSE 235	Microprocessor & Assembly Language		✓							
23	CSE 236	Microprocessor & Assembly L. Lab		✓							
24	CSE 300	Project			✓	✓					
25	CSE 311	Computer Networks					✓				
26	CSE 312	Computer Networks Lab					✓				
27	CSE 315	Computer Peripherals & Interfacing	✓				✓				
28	CSE 316	Computer Peripherals & Interfacing Lab	✓				✓				
29	CSE 321	Operating System			✓		✓				
30	CSE 322	Operating System Lab			✓		✓				

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	Code	Course Title	Programme Objectives								
			1	2	3	4	5	6	7	8	9
31	CSE 323	Web Programming			✓						
32	CSE 324	Web Programming Lab			✓						
33	CSE 327	Theory of Computation		✓							
34	CSE 415	Compiler Construction	✓	✓							
35	CSE 416	Compiler Construction Lab	✓	✓							
36	CSE 421	Artificial Intelligence								✓	
37	CSE 422	Artificial Intelligence Lab								✓	
38	CSE 423	Software Engineering			✓						
39	CSE 426	Final Year Project (Compulsory)			✓			✓			
40	CSE 436	Final Year Viva (Compulsory)			✓			✓			
Science & Mathematics Courses											
41	PHY 111	Physics I	✓								✓
42	PHY 124	Physics II	✓								✓
43	STA 215	Basic Statistics & Probability									✓
44	MAT 112	Differential and Integral Calculus									✓
45	MAT 123	Differential Equations & Laplace transform.									✓
46	MAT 135	Matrices, CV & Fourier analysis									✓
47	MAT 216	Geometry & Vector Analysis									✓
48	MAT 235	Numerical Methods/ Analysis									✓
General Education											
49	GED 113	Communicative English Language - I									✓
50	GED 125	Communicative English Language - II									✓
51	GED 233	Bangladesh Studies									✓
52	GED 219	Engineering Economics									✓
53	GED 321	Accounting				✓					
54	GED 421	Industrial Management				✓					
55	GED 431	Business Communication				✓					

	Code	Course Title	Programme Objectives								
			1	2	3	4	5	6	7	8	9
Optional Courses:											
56	CSE 331	Computer Graphics and Multimedia		✓							
57	CSE 332	Computer Graphics and Multimedia Lab		✓							
58	CSE 413	Optical Communication					✓			✓	
59	CSE 414	Optical Communication Lab.					✓			✓	
60	CSE 425	Neural Network								✓	
61	CSE 426	Neural Network Lab								✓	
62	CSE 431	VLSI Design					✓				
63	CSE 432	VLSI Design Lab					✓				
64	CSE 441	Digital Signal Processing								✓	
65	CSE 442	Digital Signal Processing Lab								✓	
66	CSE 443	Natural Language Processing		✓						✓	
67	CSE 444	Natural Language Processing Lab		✓						✓	
68	CSE 457	Parallel Processing					✓				
69	CSE 458	Parallel Processing Lab					✓				
70	CSE 461	Distributed System			✓						
71	CSE 462	Distributed System Lab			✓						
72	CSE 463	Advanced Database System			✓						
73	CSE 464	Advanced Database System Lab			✓						
74	CSE 465	Digital Image Processing								✓	
75	CSE 466	Digital Image Processing Lab								✓	
76	CSE 469	Bioinformatics Computing		✓						✓	
77	CSE 470	Bioinformatics Computing Lab		✓						✓	
78	CSE 471	Machine Learning		✓						✓	
79	CSE 472	Machine Learning Lab		✓						✓	

2.8 Graduate Profile

A graduate profile is a document containing a list of attributes, knowledge, skill and morals that are desired to be attained by the graduates of a University. Designed with input from key stakeholders, the graduate profile of Metropolitan University prioritize goals for teaching-learning that are used as a guide for students, parents, faculty and staff to align their efforts. At Metropolitan University, ten skills are considered vital for the development of a student.

	Skill Description
1	Intellectual skills
2	Practical and problem solving skills
3	Scientific and analytical skills
4	Entrepreneurship and innovation skills
5	Communication and IT skills
6	Values, ethics and morality
7	Teamwork and leadership skills
8	Professionalism
9	Social skills and responsibilities
10	Life-long learning skills

2.9 Mapping between Graduate Skills and Courses

Each course contributes to one or more generic skills listed in the graduate profile.

	Code	**Course Title**	**Generic Skill**									
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	CSE 111	Computer Technology	✓				✓					
2	CSE 121	Structured Programming		✓	✓							
3	CSE 122	Structured Programming Lab		✓	✓							
4	CSE 123	Basic Electrical Engineering		✓	✓							
5	CSE 124	Basic Electrical Engineering Lab		✓	✓							
6	CSE 125	Discrete Mathematics		✓								
7	CSE 131	Basic Electronics Engineering		✓	✓							
8	CSE 132	Basic Electronics Engineering Lab		✓	✓							
9	CSE 133	Data Structure	✓	✓	✓							

	Code	Course Title	Generic Skill									
			1	2	3	4	5	6	7	8	9	10
10	CSE 134	Data Structure Lab	✓	✓	✓							
11	CSE 200	Project		✓								✓
12	CSE 211	Digital logic Design	✓	✓								
13	CSE 212	Digital logic Design Lab	✓	✓								
14	CSE 213	Computer Organization and Architecture	✓	✓								
15	CSE 215	Telecommunication Principles	✓									
16	CSE 221	Object Oriented Programming	✓	✓	✓							
17	CSE 222	Object Oriented Programming Lab	✓	✓	✓							
18	CSE 223	Database Management System	✓	✓	✓							
19	CSE 224	Database Management System Lab	✓	✓	✓							
20	CSE 231	Algorithm	✓	✓	✓							
21	CSE 232	Algorithm Lab	✓	✓	✓							
22	CSE 235	Microprocessor & Assembly Language	✓									
23	CSE 236	Microprocessor & Assembly L. Lab	✓	✓								
24	CSE 300	Project				✓				✓		✓
25	CSE 311	Computer Networks		✓								
26	CSE 312	Computer Networks Lab		✓								
27	CSE 315	Computer Peripherals & Interfacing	✓									
28	CSE 316	Computer Peripherals & Interfacing Lab	✓	✓								
29	CSE 321	Operating System	✓									
30	CSE 322	Operating System Lab		✓								
31	CSE 323	Web Programming		✓		✓						
32	CSE 324	Web Programming Lab		✓		✓						
33	CSE 327	Theory of Computation	✓									
34	CSE 415	Compiler Construction	✓	✓	✓							
35	CSE 416	Compiler Construction Lab		✓								
36	CSE 421	Artificial Intelligence	✓	✓	✓							

	Code	Course Title	Generic Skill									
			1	2	3	4	5	6	7	8	9	10
37	CSE 422	Artificial Intelligence Lab		✓								
38	CSE 423	Software Engineering							✓	✓		✓
39	CSE 426	Final Year Project (Compulsory)				✓	✓		✓		✓	✓
40	CSE 436	Final Year Project (Compulsory)				✓	✓		✓		✓	✓
Science & Mathematic Courses												
41	PHY 111	Physics I	✓		✓							
42	PHY 124	Physics II	✓		✓							
43	STA 215	Basic Statistics & Probability		✓	✓							
44	MAT 112	Differential and Integral Calculus		✓	✓							
45	MAT 123	Differential Equations & Laplace transform.		✓	✓							
46	MAT 135	Matrices, CV & Fourier analysis		✓	✓							
47	MAT 216	Geometry & Vector Analysis		✓	✓							
48	MAT 235	Numerical Methods/ Analysis		✓	✓							
General Education												
49	GED 113	Communicative English Language - I					✓					
50	GED 125	Communicative English Language - II					✓					
51	GED 233	Bangladesh Studies	✓					✓				
52	GED 219	Engineering Economics										
53	GED 321	Accounting										
54	GED 421	Industrial Management										
55	GED 431	Business Communication					✓		✓			
Optional Courses:												
56	CSE 331	Computer Graphics and Multimedia	✓									
57	CSE 332	Computer Graphics and Multimedia Lab			✓							
58	CSE 413	Optical Communication			✓							
59	CSE 414	Optical Communication Lab.	✓									
60	CSE 425	Neural Network	✓	✓	✓							

	Code	Course Title	Generic Skill									
			1	2	3	4	5	6	7	8	9	10
61	CSE 426	Neural Network Lab		✓								
62	CSE 431	VLSI Design	✓									
63	CSE 432	VLSI Design Lab		✓								
64	CSE 441	Digital Signal Processing	✓	✓								
65	CSE 442	Digital Signal Processing Lab			✓							
66	CSE 443	Natural Language Processing	✓	✓	✓							
67	CSE 444	Natural Language Processing Lab		✓	✓							
68	CSE 457	Parallel Processing	✓									
69	CSE 458	Parallel Processing Lab		✓								
70	CSE 461	Distributed System	✓									
71	CSE 462	Distributed System Lab		✓								
72	CSE 463	Advanced Database System	✓	✓	✓							
73	CSE 464	Advanced Database System Lab	✓	✓	✓							
74	CSE 465	Digital Image Processing	✓	✓								
75	CSE 466	Digital Image Processing Lab			✓							
76	CSE 469	Bioinformatics Computing	✓	✓	✓							
77	CSE 470	Bioinformatics Computing Lab		✓	✓							
78	CSE 471	Machine Learning	✓	✓	✓							
79	CSE 472	Machine Learning Lab		✓	✓							

2.10 Teaching-Learning Methods

The department has a policy to apply a variety of teaching-learning techniques for creating a conducive learning environment.

Teaching-Learning Methods	
Method Name	**Description**
Class Lecture	Instructor explains the contents of the class according to the lesson plan using verbal and written words.

Interactive discussion	A brainstorming session usually taking place after a brief session of class lecture. Students are encouraged to contrive the contents of class and extrapolate new ideas based on creative thinking
Group work	Students are given a task in class which involves demonstrating or simulating a particular concept in the course. Two or more students form groups to solve the task, handouts are often used convey information regarding the problem and its possible solution.
Homework/Assignments	A task that must be performed based on the contents of a particular class and submitted in written form.
Lab Assignment/Task	A problem often in the computational domain that must be solved within the given time span, e.g. the duration of a single lab class, seven days and so on. Students take on programming challenges that put their skills to the test.
Group Project	Students are given a task which they must complete within a certain number of days at home and submit it to the instructor. Two or more student team up to take on the challenge which usually requires a firm grip on theoretical knowledge as well their practical applications. Example group projects may be a software in a certain programming language, a dataset for analysis and so on.
Programming Contests	The ultimate challenge for a student of computer science and engineering, programming contests are announced early and held outside class. Students are forced to combine the contents of multiple courses and come up with innovative solutions to practical computing problems. Contests are usually held one every month, followed by a result publication and prize-giving ceremony.

2.11 Curriculum Review Process

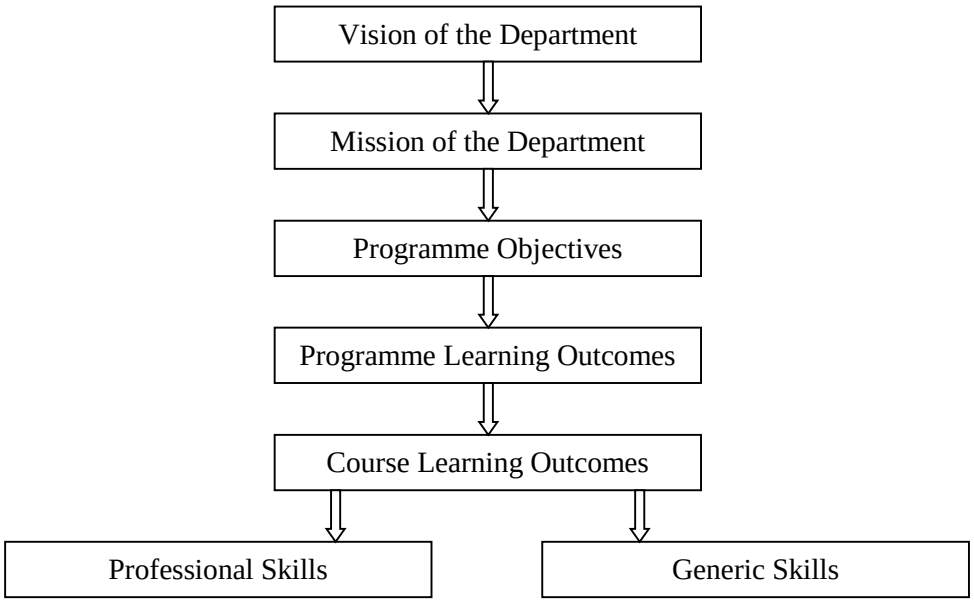
A dynamic curriculum is constantly developing in response to feedback, updated instructional formats, learner needs, and Context. Curriculum changes should be steered and recognizable by academic demands and professional confidence. A resolution was taken by the Academic Council of Metropolitan University that curriculum of every program should be reviewed and upgraded every consecutive three terms. The curriculum of CSE has been reviewed as per necessities based on recent community and social needs, professional and career requirements. Last reviewed and upgraded curriculum may be helpful to meet expectations and promote the students acquire professional skills and spirit to be of use in the field of science and technology.

The systematic and effective curriculum review process begins with the initiative to contact former students and employers with the request to participate in a survey. The survey questionnaire is designed to reflect the concerns regarding the strong and weak points of the learning material. Along with printed copies, Google forms are also provided for those who seek to complete the survey digitally. The results are collected, stored and summarized with full transparency, without disclosing the identity of the respondents.

Shortly after the responses are collected, the department Head informs the faculty members about the schedule of the review session through email. Members of the faculty acknowledge the invitation and attend the session on the fixed date. Survey results are presented and attendees propose suitable changes to the curriculum through constructive arguments and suggestions. Obsolete courses are discarded and

new ones added to meet the needs of a fast-growing industry. In the last curriculum review meeting, the credit requirements and hours of evening program were increased to accommodate the needs of the students. A decision to update the marking scheme for final year projects were also proposed.

Based on feedback from stakeholders, the marking scheme of the final year project (Appendix C: Final Year Thesis/Project and Viva Marking Scheme) was revised in a recent departmental meeting (Appendix E: Minutes of the Departmental Curriculum Review Meeting) as part of regular curriculum review. The newly proposed scheme (Appendix F: Proposed Final Year Thesis/Project Marking Scheme) was approved in the academic council meeting (Appendix G: Minutes of the Academic Council Meeting).



Chapter 3: Course Outline

Course Code	:	CSE 111: Computer Technology
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The course provides a brief review of computing fundamentals from older, mature technologies through recent and emerging technologies. Survey of various hardware and software concepts it introduces the essential concepts of procedural programming. Topics include data types, statement, keywords, expression, identifier, control structures and the mechanics of running, testing, and debugging. This course covers introductory programming and problem solving in C programming. Basic C programming and problem-solving: Problem-solving strategies; the role of algorithms in the problem-solving process; implementation strategies for C programming; debugging strategies; Fundamental programming constructs: Syntax and semantics of a higher-level language; variables, types, expressions, and assignment; simple I/O; conditional and iterative control structures;

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

1.	Course Objectives	Course Learning Outcomes	Teaching Learning	Assessment
	Improve understanding of the concepts and theories of science and technology	Would be able to understand the meaning and basic components of a computer system and gain knowledge about classification, memory, purposes of I/O, generation's, application, and functional units of computer system	Interactive discussion, real-life examples	Assignment
2.	Introducing with different number systems, their representation and conversions	Would be able to understand how computer works. Including learning the binary number system and the binary representations of data (text, pictures, and sound)	Interactive discussion	Assignment
3.	Introducing with modern computer technologies	Would be able to understand the overview of computer software including applications, operating systems and fundamentals of computer networks and the Internet	Discussion Group work Lab work, assignment	Lab tests
4.	Introducing with fundamental computer programming	Students with no prior programming experience will be able to describe programming methodologies, basic concepts of programming principles.	Discussion Group work Interactive session Applications	Assignment Class test Lab work

5.		Explain the process of problem solving using c language and Design strategies for solving problems using algorithms	Lab work, assignments related to real-life scenarios	Lab tests, oral tests
6.		Write a maintainable C program for a given algorithm and Write C program for simple applications of real life.	Interactive discussion, Lab work, Group work debate	Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	**Generic Skills* (Appendix-1)**									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.	✓		✓							
3.	✓	✓			✓		✓			
4.	✓	✓			✓					
5.	✓	✓								
6.	✓	✓			✓					

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	**Topics**
1	An overview of computers; computer system hardware: input devices, output devices, storage devices, microprocessor & motherboard, performance of a computer: processor, RAM, clock speed.
2	Number System: introduction to number system: decimal, binary, octal, hexadecimal; base conversion; introduction to logic gate; Boolean algebra
3	Operating System: operating System services; different operating systems; Windows, Macintosh; introduction to Linux operating system.
4	Important Websites: Introducing some important websites: Google, Wikipedia, Stackoverflow and so on.

	CT-1
5	Computer Networks: Types of network-LAN, MAN, WAN; network hardware devices: modem, router; network topologies; Wi-Fi, Wi-Fi Hotspot
6	Privacy and Security: securing an online account, characteristic of strong password, two-step verification system, using anti viruses
7	Artificial Intelligence: introduction; applications; Robotics, Machine Learning, Natural Language Processing.
	Midterm
9	Programming: Introduction to programming; some programming languages and their uses
10	C Fundamentals: identifier and keywords; data types; constants, variable, arrays; lifetime of variables
11	Operators; arithmetic, unary, relational, logical, Assignment
	CT-2
12-13	Control Statements: if-else; while; do-while; for; break; continue.
14	**Preparatory Leave**
15	**Final**

References : 1. Computer Fundamentals by Dr. M. Lutfar Rahman & Dr. Alamgir Hossain
2. Computer Fundamentals – by P.K.Sinha

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 121: Structured Programming
Credit Hour	:	4.5
Pre-requisite (if any)	:	Computer Technology
Course Synopsis	:	This course introduces computer programming and problem solving in a structured program logic environment. Topics include language syntax, data types, program organization, problem-solving methods, algorithm design, and logic control structures.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning**	**Assessment**
1.	To introduce students with a structured programming language C.	Students will be able to know programming methodologies, basic concepts of programming principles.	Interactive Discussion.	Oral Test Written Test
2.	To introduce students with Variables, Data Types , Expressions, and Assignment Statements, Console Input/output	Students will be able to construct small static program that take input and show results in the console.	Interactive Discussion. Lab work	Lab Test Oral Test Written Test
3.	To introduce with control statements and loops	Students will be able to construct programs that use if, else if, else and loops (for, while, do while), switch, break and continue. Take multiple input, analyze input data, and control the flow of programs.	Interactive Discussion. Lab work	Lab Test Oral Test Written Test
4.	To introduce with Function and recursion.	Students will be able to define and implement function, pass arguments and use recursion.	Interactive Discussion. Lab work Group work	Lab Test Oral Test Written Test
5.	To introduce with Structure.	Student will be able to define structure and perform different operation on it.	Interactive Discussion. Lab work Group work	Lab Test Oral Test Written Test
6.	To introduce with pointer.	Students will be able to know fundamentals operations of pointer,	Interactive Discussion. Lab work Group work	Lab Test Oral Test Written Test
7.	To introduce with competitive programming	Students will be able to solve ad hoc problems on different online judges and contests.	Interactive Discussion. Lab work Group work	Lab Test Programming Contest

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.	✓	✓								
3.	✓	✓								
4.	✓	✓			✓					
5.	✓	✓			✓					
6.	✓	✓			✓					
7.	✓	✓			✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	Topics
1-2	Introduction and Course Overview Structured Programming. Introduction to “C” language. Variable and data types, Operators.
3-5	Conditional Statement (If else, Nested if else etc.)
	CT-1
6-7	Data input and output, Control statement (for loop, while loop etc.).
8	Functions(Pass by value)
9	Midterm
10-13	Array , Program Structure , Pointer
14	Function(Pass by reference)
	CT-2
15	Structures and Union.
16	Final

References	:	1. Programming With C by Schaums outline series 2. Teach yourself C by Herbert-Scheidel
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 123: Basic Electrical Engineering
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The purpose of the course is to present the fundamentals of circuit analysis with basic concepts such as voltage, current, sources and Ohm's law. Then it proceeds to develop general and powerful procedures (nodal and mesh analyses) used in analyzing electric circuits.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning**	**Assessment**
1.	To demonstrate the circuit models for elementary components, e.g., resistors, sources, inductors, capacitors	Students would be able to determine the currents and voltages in resistive circuits using Ohm's law, KCL, KVL, reduction of series and parallel resistances, and voltage and current divisions	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
2.	To know the concepts how nodal analysis is used to calculate the node voltages	would be able to find the node voltages in resistive circuits containing current sources and voltage sources using nodal analysis	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
3.	To know the concepts how mesh analysis is used to calculate the loop currents	would be able to find the mesh currents and branch currents in resistive circuits containing voltage sources and current sources using mesh analysis	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
4.	To simplify the complex circuits using circuit theorems	would be able to analyze resistive circuits containing multiple sources by using superposition	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
5.		would be able to apply Thevenin's and Norton's theorems to simplify a resistive circuit by finding the Thevenin or Norton equivalent of a two-terminal network	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.		✓			✓					
3.		✓			✓					
4.	✓	✓			✓					
5.	✓	✓			✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-2	SI Units, basic circuit elements, definitions and units of basic circuit elements, aspects of electrical engineering
3-5	Construction of a circuit model: Ohm's law and Kirchhoff's laws, voltage divider and current divider rule, wye-delta transformations
CT 1	
6-8	Mesh and nodal analyses of general dc resistive circuits, supernode, supermesh
Mid Term Examination	
10-13	Circuit theorems: superposition, source transformation, thevenin, norton, maximum power transfer
CT 2	
14	Combinations and applications of capacitor and inductor in dc circuits with current and voltage analyses
Semester Final Examination	

References :

1. Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N.O. Sadiku
2. Electric Circuits by James W. Nilsson, Susan Riedel
3. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly

		4. Introduction to Electric Circuits by Richard C. Dorf, James A. Svoboda
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 123: Basic Electrical Engineering (EVE)
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The purpose of the course is to present the fundamentals of circuit analysis with basic concepts such as voltage, current, sources and Ohm's law. Then it proceeds to develop general and powerful procedures (nodal and mesh analyses) used in analyzing electric circuits.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	Teaching Learning	Assessment
1.	To demonstrate the circuit models for elementary components, e.g., resistors, sources, inductors, capacitors	Students would be able to determine the currents and voltages in resistive circuits using Ohm's law, KCL, KVL, reduction of series and parallel resistances, and voltage and current divisions	Discussion, Group work, Interactive session, Applications	Assignment Class test Lab performance Presentation Midterm Final
2.	To inspect the functions of Op-amp in electronic circuits	Would be able to analyze circuits containing Op-amps (ideal) – non-inverting amplifiers, inverting amplifiers, differentiators, integrators, instrumentation amplifiers and active filters	Discussion, Group work, Interactive session, Applications	Assignment Class test Lab performance Presentation Midterm Final
3.	To demonstrate a basic knowledge of solid state electronics	Would be able to understand how semiconductors can be doped to produce p-type and n-type semiconductors, introduce the p-n junction diode.	Discussion, Group work, Interactive session, Applications	Assignment Class test Lab performance Presentation Midterm Final
4.	To interpret I-V characteristics of the semiconductor diodes	Would be able to calculate the currents and voltages in a circuit containing diodes using the simple constant-voltage model for the diode(s)	Discussion, Group work, Interactive session, Applications	Assignment Class test Lab performance Presentation Midterm Final

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.	✓	✓			✓					
3.	✓	✓								
4.	✓	✓								

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-2	SI Units, basic circuit elements, definitions and units of basic circuit elements, aspects of electrical engineering
3-5	Construction of a circuit model: Ohm's law and Kirchhoff's laws, voltage divider and current divider rule, wye-delta transformations
CT 1	
6-8	The ideal Op Amp, function and characteristics of the ideal Op Amp, differential and common mode signals, configuration: inverting, non-inverting, difference, instrumentation, integrator, differentiator, filter etc.
Mid Term Examination	
10-11	Semiconductor devices, p-n junction theory
Assignment 1	
12-14	Diode applications: half wave-full wave rectifier, clipper, clamper, and/or logic gates
CT 2	
Semester Final Examination	

References : 1. Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N.O. Sadiku
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly
3. Microelectronic Circuits by Adel S. Sedra, Kenneth C. Smith
4. Electronic Devices and Circuit Theory by Robert L. Boylestad, Louis Nashelsky

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 125: Discrete Mathematics
Credit Hour	:	3.0
Pre-requisite (if any)	:	None
Course Synopsis	:	This course introduces several main areas of discrete mathematics like set theory, functions, binary relations, graph theory and trees. It emphasizes on problem solving techniques using these topics.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment Tools**
1.	To introduce the notion of logical sentences	Will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.	Interactive discussion.	Written and oral test.
2.	To enable the students to apply set theory and mathematical proof techniques	Will be able to apply set theory and functions, rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.	Interactive discussion.	Written test.
3.	To introduce function growth analysis and comparison techniques	Will be able to analyze the growth of elementary functions and determine their Big-O value; analyze simple algorithms and compare two algorithms based on computational complexity.	Group work	Written test.
4.	To enable the students to apply divide-and-conquer methods	Will be able to solve problems using divide-and-conquer recurrence relations such as the fast multiplication algorithm and binary search.	Problem solving tasks	Assignment.
5.	To familiarize the students with tree and graph structures	Will be able to utilize tree and graph algorithms.	Interactive discussions and group work	Written test, presentation
6.	To introduce the students to Boolean algebra	Will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.	Interactive discussions and individual exercise solving	Written test.

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1	✓		✓							
2	✓		✓							
3	✓	✓	✓							
4	✓	✓	✓				✓			
5	✓		✓		✓		✓			
6	✓	✓	✓							

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-4	Logic sentences, predicates, quantifiers. Logical connectives.
5-7	Set theory, functions, and methods of mathematical proof.
1st Tutorial Examination	
8-12	Growth of functions, computational complexity
Mid Term Examination	
13-16	Divide and conquer algorithms, fast multiplication algorithm, binary search
Quiz Test	
17-20	Tree and graph
2nd Tutorial Examination	
21-24	Boolean functions, Boolean algebra
Assignment	
Semester Final Examination	

References	:	1. Discrete mathematics and its applications by Kenneth H. Rosen
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 131: Basic Electronics Engineering
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The purpose of the course is to present the semiconductor devices including diodes, BJTs, and MOSFETs and their I-V characteristics and applications. This course serves as an introduction to operational amplifiers (Op Amps), and understands how feedback can be used in amplifier circuits to improve frequency response, gain stability and output and input impedances.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning**	**Assessment**
1.	To demonstrate a basic knowledge of solid state electronics	Would be able to understand how semiconductors can be doped to produce p-type and n-type semiconductors, introduce the p-n junction diode.	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
2.	To interpret I-V characteristics of the semiconductor diodes	Would be able to calculate the currents and voltages in a circuit containing diodes using the simple constant-voltage model for the diode(s)	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
3.	To estimate the Q-point of BJTs to improvise the optimal characteristics	Would be able to determine the modes of operation of the BJT and calculate the voltages and currents in a BJT dc circuit, and find the power dissipated by the BJT	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
4.		Would be able to determine the modes of operation of the BJTs and the on/off condition of the diodes, and calculate the voltages and currents in various simple BJT/diode circuits for given input voltages	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final

5.	To compare the modeling of FETs with respect to BJTs as amplifier	Would be able to know the principles of operation of the Field Effect Transistor (FET) and how an equivalent circuit for a FET can be used in transistor circuits to determine the small-signal performance of the circuits	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final
6.	To inspect the functions of Op-amp in electronic circuits	Would be able to analyze circuits containing Op-amps (ideal) – non-inverting amplifiers, inverting amplifiers, differentiators, integrators, instrumentation amplifiers and active filters	Discussion Group work Interactive session Applications	Assignment Class test Lab performance Presentation Midterm Final

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓	✓								
2.	✓	✓								
3.	✓	✓			✓					
4.	✓	✓			✓					
5.	✓	✓			✓					
6.	✓	✓			✓					

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	**Topics**
1	Semiconductor devices, p-n junction theory
	Assignment-1

2-3	Diode applications: half wave-full wave rectifier, clipper, clamper, and/or logic gates
	CT-1
4-6	DC biasing of BJT, structure and modes of operation: active, saturation, cut-off, i-v characteristics, configuration: common emitter, common base, common collector, amplifier, switch, frequency response
7	Midterm
8-9	DC biasing of FET, fixed bias, self-bias, voltage divider bias etc., CMOS, VMOS
10-12	Introduction to MOSFET, structure and operations, I-V characteristics, configuration: amplifier, switch etc., frequency response
	CT-2
13-14	The ideal Op Amp, function and characteristics of the ideal Op Amp, differential and common mode signals, configuration: inverting, non-inverting, difference, instrumentation, integrator, differentiator, filter etc.
15	Final

References :
1. Microelectronic Circuits by Adel S. Sedra, Kenneth C. Smith
2. Electronic Devices and Circuit Theory by Robert L. Boylestad,Ykslehsan Siuol
3. Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N.O. Sadiku

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : CSE 133: Data Structure
Credit Hour : 4.5
Pre-requisite (if any) : Structured Programming

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	Teaching Learning	Assessment
1.	To teach efficient storage mechanisms of data. .	Student will be able to choose appropriate data structure as applied to specified problem definition.	Discussion. Group Work Lab Work	Oral Test Written Test Lab Test
2.	To introduce various techniques for representation of the data.	Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.	Discussion. Group Work Lab Work	Oral Test, Written Test Lab Test
3.	To introduce with time and memory complexity of different data structures in terms of basic operations.	Students would be able to distinguish among different solutions in terms of memory and time complexity.	Discussion. Group Work Assignment	Home Works Oral test, Lab Test
4.	To introduce with the concept of data protection and management. .	Students would be able to choose suitable data structure based on their advantages and disadvantages.	Discussion. Group Work	Oral test Written Test
5.	To provide the concepts of searching and sorting techniques.	Ability to implement searching and sorting techniques.	Discussion. Lab Work	Lab Test

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓	✓							
2.	✓	✓	✓							
3.	✓	✓			✓		✓			
4.	✓	✓			✓					
5.	✓	✓								

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	Topics
1	Definition of data structures. Analysis tools and techniques.
2	Time space trade off, Searching.
3	Sorting techniques and their Complexity.
4	String Processing.
CT 1	
5	Array and basic operations of array. Such as traverse, insert, update and delete. Representation of linear arrays in memory.
6	Stack and Queue ADT. Expression evaluation using Stack.
7	Recursion
Midterm	
9	Linked lists and Iterators.
10	Traversing, Searching, Insertion, Deletion on Linked list.
11	Operation on two way linked list.
CT 2	
12-13	Graph and their properties.
14	Tree: Binary search tree and Heap. Huffman Coding algorithm.
Final	

References : 1. Data structure: Schaumms Outline Series
2. Fundamentals of data structures Textbook by Ellis Horowitz

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 200: Project 200
Credit Hour	:	1.5
Pre-requisite (if any)	:	Structured Programming, Data structure
Course Synopsis	:	Project focusing on programming approach and using standard algorithm is preferable. Every project should maintain a goal so that it can be used as a useful tool in the IT fields. Also innovative project ideas that require different types scripting/programming languages or programming tools can be accepted with respect to the consent of the corresponding project supervisor.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course objectives	**Course learning outcomes**	**Teaching learning activities**	**Assessment**
1.	To make students capable solving real time problems by building software projects.	Understand any real time problem and formulate solution	Lecture and Discussion	Assignment
2.	To make students understand the Data Structure and its operations in their projects.	Analyze Data structure and apply	Discussion	Assignment
3.	To make students analyze a real time issue and propose a standard solution and implement it in their projects.	a) Analyze an issue and solve it using Programming. b) Represent and manipulate data using Programming.	Lecture and Discussion	Presentation
4.	To make students understand how to write optimized code and enhance performance of software.	Analyze code for optimization	Lecture	Assignment
5	To make students understand and implement different types of standard libraries.	Implement libraries	Lecture and Discussion	Presentation & Viva

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.		✓								
2.		✓								
3.					✓					
4.					✓					
5.					✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1	Introduction to Project 200
2	Requirements analysis
3	Proposal Evaluation
4	Data Structure Analysis
5	Discussion on Structured Programming
Presentation	
6	Viva
7 & 8	Code Optimization
9 & 10	Standard Libraries
11	Project Demonstration
Project Deliver, Presentation & Viva	

References : 1. Data structure: Schaumms Outline Series
2. Fundamentals of data structures Textbook by Ellis Horowitz

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 211: Digital Logic Design
Credit Hour	:	4.5
Pre-requisite (if any)	:	Computer Technology, Basic Electrical Engineering, Basic Electronics Engineering
Course Synopsis	:	This course introduces the basic principles and concepts of modern digital systems. This includes the study of combinational and sequential systems using standard modules such as shifters, adders, registers, and counters etc. The advanced techniques for designing, analyzing and implementing the digital circuits are introduced with an emphasis on practical design techniques and circuit implementation. The laboratory provides more insight into the design and implementation of digital systems using the hardware components as well as programmable implementation technologies.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course objectives	**Course learning outcomes**	**T-L Activities**	**Assessment Tools**
1.	To explain How digital circuit of large complexity can be built in a methodological way, starting from Boolean logic and applying a set of rigorous techniques.	Students will be able to differentiate different number systems and codes.	Interactive discussion	Oral test, Written test
2.	To Interpret the formal procedures for the analysis and design of combinational circuits and sequential circuits.	Student can be able to identify how analog signals are used to represent digital values in different logic families,	Lecture, Lab work	Class test, Lab Test
3.	To examine Numerous examples and case studies will be used to illustrate how the concepts presented in the lectures are applied in practice.	Students will be able to identify different logic gates, simplify gates and design them.	Group discussion, Presentation	Quiz
4.	Introduce the concept of memories, programmable logic devices, and digital ICs.	Would be able to draw a circuit diagram for a sequential logic circuit and analyze its timing properties (input setup and hold times, minimum clock period, output propagation delays).	Laboratory work	Quiz
5.	Students will apply their knowledge to design simple digital systems based on these digital abstractions.	Would be able to Create a state transition diagram from a description of a sequential logic function.	Class lecture, Assignments	Assignment

6.		Would be able to describe the operation and timing constraints for latches, flip-flops and registers	Laboratory work	Class test
7.		Would be able to explain how to interface digital circuits with analog components (ADC, DAC, sensors, etc.).	Group project, Laboratory work	Quiz, Class test.

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓	✓							
2.		✓								
3.	✓	✓								
4.			✓		✓					
5.			✓							
6.					✓					
7.					✓					✓

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-2	Digital and Analog system, comparison, Overview of Number System and their conversion.
3-4	Signed Number Representation, Different types of Computer Codes.
5	Fundamentals of Boolean Algebra and their applications.
6	Electronic logic gates (AND,OR,NOT,NAND,NOR,X-OR,X-NOR), Switching circuits
CT 1	
7	Karnaugh Maps

8	Multiplexer, Demultiplexer and its Application
9	Half Adder, Full Adder, Parallel Adder
Midterm	
10	Subtractor, Parity bit generator and checker
11	Flip Flop and Working Principle of Latch
12	Asynchronous Counter (Up and Down) and its IC configuration
CT 2	
13	Synchronous Counter, Ring Counter
14	Programmable Logic Devices, Simplification Sequential Circuits
Final	

References : 1. Digital Systems: Principles and Applications -- by Ronald J. Tocci, Neal Widmer & Greg Moss
2. Digital Logic and Computer Design – by M. Morris Mano

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 213: Computer Organization and Architecture
Credit Hour	:	3.0
Pre-requisite (if any)	:	Structured Programming
Course Synopsis	:	Fundamental concepts underlying modern computer organization and architecture; machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course objectives	**Course learning outcomes**	**Teaching learning activities**	**Assessment**
1.	To make students understand the basic organization of modern computer systems and how computer programs are organized, stored, and executed at the machine level.	a) Understand the basics of computer hardware and how software interacts with computer hardware b) Understand how computers represent and manipulate data	Lecture, Discussion and homework	Assignment
2.	To make students understand the operation of fixed and floating-point arithmetic units	a) Understand computer arithmetic and convert between different number systems b) Explain the operation of fixed-point and floating-point arithmetic circuits	Lecture, Discussion	Quiz
3.	To make students analyze an instruction-set architecture and propose a data path and control unit implementation.	a) Understand basics of Instruction Set Architecture (ISA) – MIPS b) Identify the steps needed to execute machine instructions of an instruction set architecture c) Identify the data path elements needed to implement a specific instruction set, and explain how data path elements and control units are implemented in hardware	Lecture, Discussion and homework	Assignment
4.	To make students understand how instruction pipelining enhances processor performance.	a) Explain the principle of pipelining and the interdependencies between pipelining and instruction set design b) Analyze and evaluate computer performance	Lecture, Discussion and homework	Assignment
5	To make students understand the basic organization of the memory hierarchy.	a) Identify the main components of the memory hierarchy and explain how caches increase the apparent speed of memory b) Explain how virtual memory increases the apparent size of memory and supports the enforcement of memory protection mechanisms	Lecture, Discussion	Quiz

6.	To make students understand the basics of Digital Computer Logic.	Use Boolean algebra as related to designing computer logic, through simple combinational and sequential logic circuits	Lecture, Discussion and homework	Assignment
7.	To make students understand multicore & shared multiprocessors.	Compute speedup for parallel processing programs	Lecture, Discussion	Presentation & Viva

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓									
2.	✓									
3.		✓								
4.	✓									
5.	✓									
6.	✓									
7.	✓									

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1	Introduction to Computer abstractions and technology
2	Computer systems performance
3	Instruction Set Architecture (ISA); MIPS
Quiz 1	
4	Signed / unsigned number representations
5	Representing instructions
Mid Term Examination	

6	Central Processing Unit: datapath and control
7	Memory and Memory Hierarchy
8	Virtual memory
9	Storage
10	Input-Output organization
Quiz 2	
11	Multiprocessors and clusters
12	Digital computer logic
Presentation & Viva	
Semester Final Examination	

References : 1. David Patterson and John Hennessy, "Computer Organization and Design: The Hardware/Software Interface", 4th ed., Morgan Kaufmann, 2011

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : CSE 215: Telecommunication Principles
Credit Hour : 3.0
Pre-requisite (if any) : N/A
Course Synopsis : This course provides an introduction to the telecommunications area. The objectives include: familiarity with the technologies involved in modern telecommunications systems; quantitative understanding of basic concepts of communications. Topics include bandwidth and information capacity; amplitude and frequency modulation; decibels; wireline and wireless communications; fiber optics; digital modulation; the telephone system; cellular networks; local area networks; Internet.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment tools**
1.	Understanding basic terms and principles of signal processing in telecommunication transmission	Understand and possess the basic concepts, principles and tools for the description of telecommunication signals and systems.	Lecture, Discussion	Assignment, Q/A, MCQ
2.	Describing basic principles of the modern digital telecommunications	Understand and possess the basic concepts, principles and characteristics/parameters of modulations systems, analog - to - digital conversion systems, time/frequency division multiplexing, noise in telecommunication systems.	Lecture, Discussion, Problem based learning, Exercise	Assignment, Q/A, MCQ
3.	Implementing acquired knowledge in professional specialist courses (theoretical)	Describe theoretically and draw in block diagram form the operation of various telecommunication sub - systems (transmitter, receiver, etc.) using mathematical expressions.		Assignment, Q/A, MCQ
4.	Understanding basic operation settings for telecommunication systems and equipment	Study the basic characteristics of various telecommunication sub - systems, and record performance parameters		Assignment, Q/A, MCQ
5.		Collaborate in a team to analyze a composite telecommunication problem and synthesize a solution.		Assignment, Q/A, MCQ
6.		Evaluate alternative solutions and select the appropriate for a given problem.		Assignment, Q/A, MCQ
7.		Search for analysis and synthesis of the data and information, with the use necessary technology	Internet	Assignment

8.		Will be able to Think independently.	Problem Solving	Assignment
9.		Will be able to Team work.	Problem Solving, Homework, Group Study	Assignment, presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1	✓									
2	✓			✓						
3				✓						
4	✓			✓						
5			✓	✓	✓	✓				
6						✓				
7			✓	✓						
8						✓				✓
9					✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Weeks	Topics
1	Introduction, History and Evolution of telecommunication, Elements of telecommunication system, Analog & Digital signal, Bandwidth
2	Telecommunication System, Line system characteristic, Radio System characteristic, Switching system
3	Waveforms & Filters, Voice Frequency, Attenuation & Noise
4	Amplitude Modulation, Frequency Modulation and Pulse Modulation, LAN, WAN, MAN

Quiz Test 1	
5	PBX telephones, Centrex, Step by step telephone exchange, Reed Relay & Crossbar exchange
6	Digital Exchange, Local Distribution Network, Optic Fiber, Radio Propagation
7-8	Antenna, Satellites, Mobile Radio System
9	Traffic Theory
Mid Term Examination	
10	FDM, TDM, PCM, ISDN
11-12	Cellular Mobile Communication
13	Digital Fundamentals, Internet
Quiz Test 1	
14	Review, Presentation and Discussion on total course
Semester Final Examination	

References : 1. Communication Electronics, by Frenzel
2. Telecommunication Switching Systems and Networks, by ThiagarajanViswanathan
3. Introduction to Telecommunications, by Marion Cole
4. Mobile and Personal Communication Systems and Services, By Rajpandya

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 221: Object Oriented Programming
Credit Hour	:	4.5
Pre-requisite (if any)	:	Structured Programming
Course Synopsis	:	The purpose of the course is to give a concept of object oriented programming. The course begins with emphasis on control structures, structured data types and array processing. It then moves on to introduce the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design, and tools and techniques for software development.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning**	**Assessment**
1.	To illustrate the concept of object orientation.	Differentiate between structured and object oriented programming and the facilities of using OOP in real life environment.	Interactive discussion, real life examples.	Written and Oral test, assignments
2.	To facilitate students to understand the implementation fields of object orientation	Ability to understand the implementations of object orientation in system analysis and design, programming and database model.	Demonstration, group work.	Quiz
3.	To introduce the students to a well-known object oriented programming language and it's syntactic structure.	Construct programs in the object oriented programming language.	Lab work, assignment.	Lab tests
4.	To enable the students to utilize previously studied data structures and algorithms using object-oriented concepts.	Demonstrate searching and sorting algorithms using the newly learned language	Demonstration, programming contests.	Open book lab exam, quiz
5.	To arm the students with the skills to design and implement a Graphical User Interface.	Ability to develop software with Graphical User Interface.	Lab assignments.	Presentation/ showcasing
6.	To equip the students with the knowledge to develop software using object oriented approaches.	Create mobile/web applications.	Group project work, feedback.	Project presentation and peer assessment

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓									

2.	✓									
3.		✓								
4.		✓								
5.					✓					
6.					✓					

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	**Topics**
1-2	JVM, Bytecode, identifiers, keywords, types, arrays, methods, control statements
3-5	Introduction to classes and objects, constructors, inner class
CT 1	
6-8	Inheritance, abstract class and interface, packages, access protection
Midterm	
10-13	Exception handling, files
CT 2	
14	Multithreaded programming
Semester Final	

References : 1. Java How to program by Dietel
2. Complete Reference Of Java by Herbert Schieldt

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 223: Database Management System
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The course deals with the notion of database systems, from the development point of view. The primary goal of the course is to introduce the fundamental concepts of database systems and different database models. The course is emphasizing mainly on Relational Database concepts, different designing methodologies and practical orientation with a professional RDBMS.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course learning outcomes**	**T-L Activities**	**Assessment**
1.	To illustrate the concept of Software Architecture.	Differentiate between different software architectures and their pros and cons.	Lecture	Quiz
2.	To facilitate students to understand the implementation area of different data models in Software Architecture.	Ability to understand the architecture of Database Management System and its Advantages compare to other data models.	Lecture	Quiz
3.	To introduce the student to Different Database Models.	Ability to understand the structure of Relational Model and some Post Relational Models.	Lecture, Lab Work	Assignment
4.	To arm the students with the skills to design a quality database structure.	Ability to construct a Logical Schema in Relational Model.	Lecture, Lab Work	Assignment, Presentation
5.	To enable student to implement the logical database structure.	Ability to implement the Logical Schema in a RDBMS using Data Definition Language.	Lecture, Lab Work	Assignment, Lab Test
6.	To enable student to Manipulate data form database.	Ability to solve basic and advance query problems using Procedural and Nonprocedural Data Manipulation Languages.	Lecture, Lab Work	Class Test, Lab Test
7.	To equip the students with the knowledge to develop software using Database Management System.	Ability to construct Three Tier Application using RDBMS.	Lecture, Lab Work	Assignment, presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1	✓									
2	✓									
3	✓									
4		✓								
5		✓								
6		✓								
7					✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1	Introduction to software Architecture and web architecture, Introduction to MVC model, File Management System as a Data Layer and its weaknesses, Features of DBMS and its strengths. View of data, Instance and schema, different data models
2	Introduction to Relational Data Model, Introduction To MySQL as RDBMS, Architecture of RDBMS Transaction Manager, Query Optimizer, Introduction To MySQL as RDBMS
CT 1	
3-4	Database Languages DDL and DML, Introduction to SQL as DDL from MySQL manual.
Mid Term Examination	
5	Entity Relationship Diagram as Database designing methodology
Presentation	
6	Design and implement an example database schema in MySQL.
7	Introduction to SQL as DML
8	Connectivity between RDBMS and Server Side Scripting Language

9-10	Relational Algebra as Procedural DML
11	Query Optimization
CT 2	
12 & 13	Advance SQL, Normalization as RDBMS designing methodology
14	Introduction and implementation of PL/SQL
15	Post Relational Models like Object base Data Model, Semi Structured Data Model and Basic Concept of Data Warehouse.
Presentation	
Semester Final Examination	

References : 1. Database System Concepts [6th Edition] Abraham Silberchatz, Henry F. Korth, S. Sudarshan
2. Modern Database Management [12th Edition] by Jeffrey A. Hoffer, Reshma Venkataraman, Topi Heikki

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 231: Algorithm
Credit Hour	:	4.5
Pre-requisite (if any)	:	Structured Programming, Data Structures
Course Synopsis	:	Increasing problem solving ability using specific techniques. Ability to understand the problem scenario and finding out best suited algorithmic approach. Analyzing the constraint of time and space management.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	Teaching Learning Method	Assessment
1.	To increase problem solving ability using specific techniques	Would be able to solve problems of different domain like graph, tree, dynamic programming, string etc.	Interactive discussion problem based discussion group work lab work	Lab task quiz
2.	To instruct to understand the problem scenario and find out the best suited algorithmic approach	Would be able to find out solution of different problems and implementation of best suited algorithm.	Interactive discussion problem based discussion group work lab work	Lab task quiz
3.	To instruct to analyze the constraints of time and space management	Would be able to optimize the complexity in time and space domain	Interactive discussion	Written test, quiz
4.		Would be able to implement different algorithmic strategy	Interactive discussion problem based discussion group work lab work	Lab task quiz

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.	✓	✓								
3.	✓	✓								
4.	✓	✓	✓							

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	Topics
1-2	Introduction to algorithm and Mathematical Foundations such as Growth of Functions , Summations and Recurrences , Sets, Relations, Functions, Graphs, and Trees .
3-4	Sorting and Order Statistics (Heap sort, Quicksort, Lower Bounds for Sorting, Sorting in Linear time), Stacks, lists, queues, recursion,
5-6	Design and Analysis Techniques (Dynamic Programming: Matrix Chain Multiplication, LCS, Coin Changing, 0/1 knapsack)
CT-1	
7-9	Design and Analysis Techniques (Greedy Algorithms: Activity selection, Knapsack)
Midterm	
10-12	Basic Graph Algorithms, Spanning Trees
13	Shortest Path Algorithms, Max Flow*
CT-2	
13-14	Backtracking(N-Queen), Branch and Bound(15 Puzzle)
15	Number-Theoretic Algorithms
16	Final

References : 1. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.
2. Data Structures and Algorithms Made Easy by Narasimha Karumanchi.
3. Algorithms by Robert Sedgewick, Kevin Wayne

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students : 1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 235: Microprocessor and Assembly Language
Credit Hour	:	4.5
Pre-requisite (if any)	:	Computer Organization & Architecture
Course Synopsis	:	The main purpose of this course is to provide comprehensive idea of Microprocessor and its components. This course focuses Intel 8086 and 8088 microprocessor based Assembly Language that helps students to estimate the time and space complexity of high level programming language like C, C++ and Java.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning Method**	**Assessment**
1.	To discuss the working principles of microprocessor and microcontroller	Will be able to understand basics of microprocessor and microcontroller	Lecture	Written test and assignment
2.	To define the main components and working principles of the Intel 80x86 microprocessor	Will be able to solve basic programming operations using the microprocessor or microcontroller	Lecture, Interactive discussion and Lab Work	Written, Oral test and assignment
3.	To discuss Programming and debugging techniques of microprocessors	Will be able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor	Lecture, Interactive discussion and Lab Work	Written, lab and oral test
4.	To practice program and debug in assembly language for different microprocessors and microcontrollers and analyze the actual performance of different microprocessors	Will be able to program using the capabilities of the stack, the program counter, and the status register, and analyze how these are used to execute a machine code program	Lecture, Lab Work and Acting like a device (simulation)	Written, lab and oral test
5.	To ensure the ability to interpret acquired knowledge to defend practical low level programming problems.	Will be able to apply knowledge of the microprocessor's internal registers and operations by use of a microprocessor simulator	Problem solving tasks.	Written, lab and oral test test
6.	To explain how to calculate the complexity of any high level language program using low level programming	Will be able to estimate the actual complexity of high level programming languages like java or C#	Interactive discussions and group work	Written test and assignment

Curriculum

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1		✓								
2		✓								
3		✓	✓							
4		✓	✓							
5		✓	✓							
6		✓	✓							

Lecture Schedule

Lectures	Topics
1-3	Introduction to Microprocessors, Basic organization, Basic Computer Architecture
4-6	SAP Architectures, Instructions, Microprogram; 8-bit bus, 4-bits program counter, 4-bits Memory Address Register(MAR),16x8-bit memory,
CT-1	
7-11	Fetch Operation and Timing Diagram; Execute Operation and Timing Diagram, Machine Cycle and States
Midterm	
12-15	Functional Block Diagram and Pin configuration, Timing and Control Unit, Registers, Data and Address Bus, Instruction, Operation Code and Operands, Addressing Modes, Interrupts, Flags, Instructions and DataFlow
Quiz Test	
16-18	Assembly Language Programming(9Hrs) Assembly instruction format, Instruction Types, Mnemonics, Operands, Macro assemblers, Linking etc
CT-2	
19-20	Assembler directives, Simple sequence programs, Flags, Branch, Jumps, While-Do, Repeat-Until, If-Then- Else and Multiple If-then Programs, Debugging, Macros etc

Presentation and Simulation	
21-25	Digital communication (Serial and Parallel), Basic Memory functionality
Final	

References	:	1. A.P. Malvino and J. A. Brown, Digital Computer Electronics, 3rd Edition, TataMcGrawHill 2. Introduction to 8085 Microprocessor for Engineers and Scientists, A.K. Gosh, Prentice
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 311: Computer Networks
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The aim of this course is to provide students with an overview and fundamentals of data communication and computer networks. It provide the students with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in this area. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks), routing protocols, bridges, routers and gateways; network naming and addressing; and local and remote procedures.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning Method**	**Assessment**
1.	To provide a solid foundation to the students about architectural concepts of data communications and computer networking	Describe the services, functions, and inter-relationship of different layers in network models.(Open system Interconnection Reference (OSI) Model)	Lecture, Discussion, Problem based learning, Exercise	Assignment, Q/A, MCQ
2.	To enable the students to master the knowledge about data communications and computer networking in the context of real-life applications	Describe how components in different layers inter-operate and analyze their performance (Transmission Control Protocol /Internet Protocol (TCP/IP)).	Lecture, Discussion, Problem based learning, Exercise	Assignment, Q/A, MCQ
3.	To prepare the students for understanding, evaluating significantly, and assimilating new knowledge and emerging technology about computer networks	Design solutions to solve engineering problems that require the applications of computer network technology. Metropolitan Area Network(MAN) ,ROUTING	Laboratory sessions	Lab Test
		Describe how rapid progress of computer and network technology can impact on the society.	Lecture, Discussion, Problem based learning, Exercise	Assignment, Q/A, MCQ

		Present ideas and findings effectively. Local Area Network(LAN),Virtual LAN (VLAN)	Laboratory sessions	Lab Test
		Will be able to Think independently.	Problem Solving	Assignment, Q/A, MCQ
		Will be able to Learn independently.	Problem Solving, Home work	Assignment

Mapping of Course LO and Generic Skills:

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.				✓						
2.				✓						
3.				✓		✓				
4.									✓	
5.	✓		✓	✓						
6.						✓				✓
7.	✓					✓				✓

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Weeks	**Topics**
1	Introduction, Data Communications, Networks, Internet, Protocols and standards
2	Layered Task, OSI Model, TCP/IP
3-5	Transmission Media (Guided and Unguided Media), Switching(Circuit, Datagram ,Packet, and Virtual Circuit Switched Networks)
1st Tutorial Examination	
6 & 7	Error Detection & Correction, Flow and Error Control

Mid Term Examination	
8	Cryptography(Symmetric-key , Asymmetric-key Cryptography)
9	Congestion Control and Quality of Service
10-11	Logical Addressing
12	Network Layer(Delivery, Forwarding and Routing)
13	Wireless LANs : Ethernet
Quiz Test	
14	Review and Discussion on total course
Assignment	
Semester Final Examination	

References : 1. Data Communications and Networking by Behrouz A Forouzan
2. Cisco Certified Network Associate (4^{th} or 5^{th} or 6^{th} edition)-By Todd Lammle

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : CSE 315: Computer Peripheral and Interfacing
Credit Hour : 4.5
Pre-requisite (if any) : Microprocessor and Assembly language
Course Synopsis : The main purpose of this course is to provide fundamental knowledge of different Peripheral devices of the computer and make them qualified to perform software and hardware interface of these peripheral devices.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	Teaching Learning Method	Assessment
1.	To describe principles of system buses, pin mapping and configurations of different peripheral devices	Will be able to understand the principles of different peripherals configuration and interfacing	Interactive Discussion	Written and oral test, presentation
2.	To explain principles of controlling peripheral operations together with different types of peripheral interfaces	Will be able to define and analyze digital peripheral devices and microprocessors such as EPROM, HDD, SSD, Keyboard, RAM, different encoders and decoders	Interactive Discussion and Lab Work	Written and Oral test
3.	To define the principles of interfacing peripheral devices related with 8086 and 8085 microprocessor	Will be able to select, appropriate and compatible computer/peripheral combinations to perform interfacing operations	Interactive Discussion	Written, lab work and oral test
4.	To analyze different hardware and software interfacing problems and interpret idea to solve problems individually or with team	Will be able to interface different peripheral devices and sensors with computers and microcontrollers	Lab Works and Acting like a device (Simulation)	Written, lab work and oral test
5.	To facilitate an intensive idea to work with different microcontrollers (ATMega328) and sensor interfacing.	Will be able to collaborate with others in a small group to solve common interfacing problems	Problem solving tasks.	Lab and oral test

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1		✓								
2		✓								
3		✓	✓							
4		✓	✓							
5		✓	✓							

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Lectures	Topics
1-3	Definition and history of peripheral equipment, basic interfacing concepts of Microprocessors, Microcontrollers and their peripherals.
4-6	Data transfer with the host computer. Serial and Parallel peripherals interfacing, Interruptions and DMA, interfacing configurations, applications and details features of different types of USB.
CT-1	
7-11	Interfacing principles of different Storage devices. Interfacing techniques ROM, EPROM, SD Card, HDD, SSD etc.
Midterm	
12-15	Interfacing principles of different input devices and relevant ICs. Interfacing techniques of Keyboard, Mouse, Keypad ICs and their communication system with CPU.
Quiz Test	
16-18	Different output peripherals interfacing techniques like VGA port, HDMI, port, DVI port, printers
CT-2	
19-20	Basic knowledge about microcontroller based operations, difference between microprocessor and microcontroller

Presentation and Simulation	
21-25	Digital communication (Serial and Parallel), Basic Memory functionality
Final	

References	:	1. Computer Peripheral & Interfacing by Gourav Gupta, Eagle Prakashan, Jalandhar 2. Computer Peripherals, 2nd Edition by Leo F. Doyle 3. The Intel Microprocessor, 8th Edition by Barry B. Brey
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 321: Operating System
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The course is designed to provide a clear concept about the internal operations of modern operating systems, what they do and how they are designed and constructed. The course will introduce students to different CPU scheduling algorithms needed for process managements. Brief description about Multi-threads, deadlock, Memory management, Storage management, protection and security.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Method**	**Assessment**
1.	To provide a clear concept about internal operations of modern operating systems this field.	Would be able to explain basic operating system concepts and components.	Interactive discussion, real-life examples	Assignment
2.	To provide a clear concept about design and construction of operating systems	Would be able to compare single- and multitasking, and single- and multiuser OS	Interactive discussion, Lab work	Written and Oral test
3.	To introduce with different CPU scheduling algorithms for process management	Would be able to programmatically demonstrate different CPU scheduling algorithms and choose the suitable one in terms of performance.	Discussion Group work Lab work,	Lab tests
4.	To briefly introduce with some key concepts like multi-threads, deadlock, memory management, storage management, protection and security	Would be able to address authentication and security requirements of an operating system.	Discussion Interactive Lab work	Written Test
5.		Would be able to demonstrate resource sharing mechanisms of a complex software system.	Lab work, assignments related to real-life scenarios	Lab tests, oral tests

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓									
2.	✓		✓							
3.	✓	✓					✓			

4.	✓	✓								
5.	✓	✓								

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	**Topics**
1	Welcome, motivations, Introduction, Operating System History. Processes and Threads
2	Processes and Threads, Locks and Condition Variables. Implementing Locks
3-4	Different CPU scheduling Algorithms, Deadlock, Linkers
CT-1	
5-6	Dynamic Storage Management, Virtual Memory
7	Demand Paging
8	Storage Devices
Midterm	
9	File Systems
10	Directories and Links, File System Crash Recovery
11	Protection and Security
CT-2	
12-13	Virtual Machines
14	PL
15	Final

References : 1. Operating System Concepts by Avi Silberschatz
2. Modern Operating Systems by Andrew S. Tanenbaum

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 323: Web Programming
Credit Hour	:	2.0
Pre-requisite (if any)	:	Telecommunication Principles, Database Management System, Object Oriented Programming
Course Synopsis	:	This course will introduce the students with web architecture, web application development, enable them to develop their own applications on web platform as web professionals.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives(CO)	Learning Outcomes(LO)	TL Activities	Assessment
1.	To provide introduction to Web Architecture, Web Programming & Web Technologies, Web-documents	Describe web architecture, client-server communication, distinguish tools and technologies of web programming	Lectures	Quizzes
2.	To introduce the students with HTML,CSS, JavaScript	Create web documents using HTML, CSS and JS.	Demonstration, Group work	Quizzes
3.	To demonstrate DHTML Framework	Develop web documents using DHTML framework (e.g.- Twitter Bootstrap)	Demonstration, Group work, Assignment	Quizzes, Presentation
4.	To introduce the students with Server-side Programming (using PHP/JSP/Python/Node.js) and Object Oriented Programming with any of the selected language mentioned above.	Write server side scripts in PHP/JSP/Python/Node.js transact DB operations. Eventually deploy web applications.	Lectures, Demonstration, Group work, Assignment	Quizzes, Lab Test
5.	To introduce MVC web framework of selected server side scripting language and demonstrate a tiny project	Develop web application (using Codeigniter/ Laravel/Spring/ django/flask/mean) in professional manner.	Lectures, Demonstration, Group work, Assignment	Quizzes, Presentation, Project Development

Mapping of Course LO and Generic Skills:

Learning Outcome (LO)	Generic Skills* (Appendix-1)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	✓	✓	✓							
2	✓		✓			✓	✓			✓

3	✓		✓			✓	✓			✓
4	✓		✓			✓	✓			✓
5	✓		✓		✓	✓	✓			✓

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Week(s)	**Topics**
1,2	Introduction to Web Programming & Web Technologies Web-documents, HTML
3	Quiz
4-6	CSS, JavaScript
7,8	DHTML Framework
9	Server-side Programming (using PHP/JSP/Python)
10	OOP practice of selected Scripting language
Written Test	
12,13	MVC web framework of selected Scripting language (Codeigniter/Laravel/Spring/ django/flask/mean), Developing tiny project using cutting edge technologies & Guidelines to develop a robust Web Project.
14	Project Development & Presentation

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 327: Theory of Computation
Credit Hour	:	3.0
Pre-requisite (if any)	:	None
Course Synopsis	:	The goal of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students will be able to construct finite state machines and the equivalent regular expressions. They will learn to prove the equivalence of languages described by finite state machines and regular expressions. They will learn to construct pushdown automata and the equivalent context free grammars and to prove the equivalence of languages described by pushdown automata and context free grammars.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course learning outcomes	T-L Activities	Assessment
1.	To introduce the students to the theories of formal computation	Would be able to describe knowledge of formal computation	Interactive discussion using examples	Written and oral test
2.	To enable the students to use regular expressions and finite state machines	Would be able to construct finite state machines using regular expressions	Interactive discussion and group work	Written test
3.	To familiarize students with complementary notions of languages and grammar	Would be able to distinguish different computing languages and grammar	Interactive discussion using examples	Written test
4.	To establish a sense of formal reasoning among students	Would be able to establish formal reasoning about languages and grammar	Interactive discussion	Written and oral test
5.	To provide the students with the knowledge to design and use automaton	Would be able to analyze and design pushdown automata and finite automata	Assignment	Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓		✓							
2.	✓	✓	✓							
3.	✓									
4.	✓		✓							
5.	✓	✓	✓		✓		✓			

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-4	Language theory
5-7	Deterministic and non-deterministic finite automata
1st Tutorial Examination	
8-12	Regular expressions and Regular grammars
Mid Term Examination	
13-16	Context-free grammars
Quiz Test	
17-20	Pushdown Automata
2nd Tutorial Examination	
21-24	Turing machines, halting problem
Assignment	
Semester Final Examination	

References : 1. Formal Languages and Automata by Peter Linz

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Curriculum

Course Code	:	CSE 331: Computer Graphics and Multimedia
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	This course covers the hardware and software principles of interactive raster graphics. Topics covered include an introduction to the basic image processing concepts, 2-D and 3-D modeling and transformations, viewing transformations, projections, rendering techniques, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment:

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessment tools
1.	To introduce the students to the history of computer graphics	Will be able to appreciate the history and evolution of computer graphics	Discussion	Oral test
2.	To provide knowledge about various graphics models	Will be able to recall how modern computer graphics systems and models work.	Discussion	Written test
3.	To develop an understanding of various transformation techniques	Will be able to perform 2D and 3D transformations on geometric shapes on the Cartesian plane.	Discussion	Written test
4.	To introduce the concept of clipping and several clipping algorithms	Will be able to clip lines using Cohen-Sutherland, Liang-Barsky clipping algorithm, and polygons using Weiler-Atherton, Sutherland-Hodgeman clipping algorithm.	Lab work	Lab test
5.	To build an understanding of perspectives and the challenges associated with implementing them using computers	Will be able to identify perspectives and solve hidden surface problems with Painter's algorithm, z-buffer algorithm.	Lab assignment	Lab test
6.	To enable the students to construct interactive graphical programs using graphics API	Will be able to use a graphics API (OpenGL) to create graphics primitives and implement basic filling and clipping algorithms.	Lab project	Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓									
2.	✓	✓								

3.	✓	✓	✓							
4.	✓	✓	✓							
5.	✓	✓	✓							
6.	✓	✓			✓		✓			

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1-4	History of computer graphics, color models
5-7	Bresenham's line and circle drawing algorithm
1st Tutorial Examination	
8-12	2D and 3D transformations
Mid Term Examination	
13-16	Line clipping, polygon clipping
Quiz Test	
17-20	Perspectives and perspective anomalies
2nd Tutorial Examination	
21-24	Hidden surface algorithm, painter's algorithm, z-buffer algorithm
Assignment	
Semester Final Examination	

References : 1. Computer Graphics by Zhigang Xiang and Roy Plastock

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 415: Compiler Construction
Credit Hour	:	4.5
Pre-requisite (if any)	:	Theory of Computation
Course Synopsis	:	The course is intended to familiarize the students with the basic techniques that underlie the practice of Compiler Construction. The course will introduce the theory and tools that can be standardly employed to convert a high-level programming language into an executable program. By the end of the semester, students will have a good understanding of the structure of a compiler, how to perform parsing (top down and bottom up), construct a Context Free Grammar (CFG), implement efficient mechanisms for lexical analysis and create a parse table from a CFG. They will also learn different compiling techniques and various intermediate representations.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment:

	Course objectives	**Course learning outcomes**	**T-L activities**	**Assessment**
1.	To introduce with fundamentals of compiler construction	Would be able to explain the structure of a compiler and how a source code is transformed to an executable program, using a compiler	Interactive discussion using examples	Written and oral test
2.	To familiarize students with different formations of formal language	Would be able to generate languages from regular expressions and grammars	Interactive discussion and group work	Written test
3.	To enable students to make use of automata	Would be able to make use of NFA, DFA to implement a lexical analyzer	Lab work	Lab test
4.	To provide knowledge about patterns, lexemes and tokens	Would be able to identify patterns found in lexemes and group them into tokens	Lab work	Lab test and assignment
5	To introduce students with fundamentals of and operations on syntax directed translation	Would be able to identify inherited and synthesized attributes and construct annotated parse tree	Interactive discussion and group work	Presentation
6.	To provide knowledge on intermediate code generation	Would be able to make use of different data structures of intermediate codes such as triples, quadruples etc	Class lecture	Oral test, written test

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓									
2.	✓									

3.		✓								
4.	✓	✓								
5.	✓				✓		✓			
6.	✓				✓		✓			

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1-4	Introduction to compiler, language, grammar, pattern, token, lexeme
5-7	Deterministic and Non-deterministic finite automata
1st Tutorial Examination	
8-12	Lexical analysis, Syntax analysis, parse tree
Mid Term Examination	
13-16	First, Follow, Parsing table
Quiz Test	
17-20	Syntax directed translations, Annotated parse tree
2nd Tutorial Examination	
21-24	Intermediate code generation, three address code, triples, quadruples
Assignment	
Semester Final Examination	

References : 1. Compilers - principles and techniques by Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 421: Artificial Intelligence
Credit Hour	:	4.5
Pre-requisite (if any)	:	N\A
Course Synopsis	:	The course provides brief overview on problem domains of artificial intelligence, problem categorization, problem specification, problem solving system properties. Searching techniques like best first search, generate and test, hill climbing, problem reduction, constraint satisfaction, means end analysis etc. are introduced in this course. Knowledge representation issues, knowledge representation approach, properties of a good knowledge representation system are briefly described here. Predicate logic, propositional logic, resolution are also covered in the course. Different planning techniques like goal stack planning, game playing, alpha-beta cut off will be introduced in the course.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning**	**Assessment**
1.	To provide comprehensive knowledge on artificial intelligence.	Would be able to share a clear concept about AI, its present and future	Interactive discussion, real life examples	Idea sharing Presentation
2.	To introduce with different problem domains of AI, problem representation techniques, solution searching techniques etc.	Would be able to categorize a specific problem according to the problem domains of AI.	Interactive discussion, real life examples	Quiz, written test oral test
3.	To introduce with some basic issues of AI like representation of knowledge, planning, understanding etc.	Would be able to represent a problem according to some standard definitions.	Interactive discussion, real life examples	Scenario based written test
4.	To provide knowledge to represent facts using predicate logic.	Would be able to design a problem solving system maintaining all basic criteria.	Interactive discussion, real life examples	Scenario based written test
5.		Would be able to apply some heuristic searching techniques like hill climbing, generate and test, mean end analysis, best first search, constraint satisfaction etc.	Interactive discussion, group work, lab work, assignments	Lab task Written test Presentation

6.		Would be able to implement different planning techniques like goal stack planning etc in problem solving systems.	Interactive discussion ,lab work, assignments	Lab task Written test
7.		Would be able to implement different mapping techniques for problem understanding.	Interactive discussion	Scenario based written test
8.		Would be able to use predicate logic for representing facts.	Interactive discussion	Scenario based written test
9.		Would be able to choose suitable approach for representing the knowledge of problem.	Interactive discussion, group work	Scenario based written test
10.		Would be able to merge all the building blocks of AI for solving a real life problem.	group work	Lab project Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓				✓					
2.	✓		✓							
3.	✓	✓								
4.	✓	✓								
5.	✓	✓	✓							
6.	✓	✓								
7.	✓	✓								
8.	✓	✓								
9.	✓	✓								
10.	✓	✓			✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	Topics
1-2	Introduction to AI, problem categorization, problem specification, problem solving system analysis
3-7	Heuristic search techniques like generate and test, hill climbing, best first search, problem reduction, constraint satisfaction, means ends analysis
	CT 1
8-9	Knowledge representation issues, approaches, properties
10	Mid Term
11-12	Propositional logic, predicate logic, mathematical reasoning, computable function
13-14	Game planning, alpha beta cut off
	CT 2
15	Goal stack planning
16	Preparatory Leave
17	Final

References : 1. Artificial Intelligence: a modern approach, S. Russell and P. Norvig, Prentice Hall, ISBN0-13-080302-2
2. Compilers - principles and techniques by Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 423: Software Engineering
Credit Hour	:	3
Pre-requisite (if any)	:	Object Oriented Programming
Course Synopsis	:	It covers the approaches taken in developing large programming projects, including requirements analysis, specification, design, coding, debugging and testing, maintenance, and thorough documentation as illustrated by examples and papers from current literature. This course will prepare students for working in teams to build quality software, and it provides the necessary hands-on practice for those who wish to enhance their knowledge base.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment**
1.	Introduce software, Software Engineering, Software Development Process and Various Life Cycle Models.	Describe Software Engineering, Software Development Process and Various Life Cycle Models.	Lectures	Quizzes
2.	To demonstrate sources of Information Systems and enable them to choose the appropriate source for developing Software.	Explain different sources of software including outsourcing, how to evaluate off-the-shelf software, how to reuse and its role in software development.	Lectures	Quizzes
3.	To enable to follow software engineering principles through Software development process and analyze Software Requirements	Understand Communication Techniques, Analysis Principles, and Software Prototyping, create Requirement Specification.	Lectures, Assignment	Quizzes
4.	To facilitate Software Testing	Describe Testing fundamentals, test case design and perform white-box testing, black-box testing, testing GUIs, Unit testing, Integration testing, validation testing, system testing, debugging.	Lectures, Assignment	Quizzes, Presentation
5.	To discuss skills and activities of an effective project manager and project management process, Cost estimation, risk analysis, project scheduling.	Describe the skills and activities required to be an effective project manager. Develop the project charter, Gantt charts and Network diagrams, represent and manage project schedules Describe the steps involved when identifying and selecting projects and initiating and planning projects and Perform cost-benefit analysis	Lectures, Assignment	Quizzes, Presentation

6.	To introduce to Software Maintenance	Perform Major maintenance activities, estimating maintenance cost and productivity,	Lectures, Assignment	Demonstration

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	**Topics**
1-2	Process Models: waterfall, iterative, evolutionary, Component based software engineering
3-5	Agile development, extreme programming, scrum
CT-1	
6-8	Requirements engineering: functional and nonfunctional requirements
Midterm	
10-13	Software testing: unit testing, integration testing, system testing Risk management
CT-2	
14	Maintenance and reengineering: software maintenance, supportability, reengineering, reverse engineering
Final	

References : 1. Software Engineering: A Practitioner's Approach by Roger S. Pressman
2. Software Engineering by Somerville

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 443: Natural Language Processing
Credit Hour	:	4.5
Pre-requisite (if any)	:	N/A
Course Synopsis	:	This course provides an introduction to the field of Natural Language Processing. It includes relevant background material in Linguistics, Mathematics, Probabilities, and Computer Science. Some of the topics covered in the class are Text Similarity, Part of Speech Tagging, Parsing, Semantics, Question Answering, Sentiment Analysis, and Text Summarization.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Method**	**Assessment Tools**
1.	To understand natural language processing and to learn how to apply basic algorithms in this field.	Would be able to evaluate NLP based systems.	Interactive discussion, real-life examples	Assignment
2.	Compose key NLP elements to develop higher level processing chains	Would be able to describe the typical problems and processing layers in NLP.	Interactive discussion, Lab work	Written and Oral test
3.	Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, clustering and unsupervised methods.	Would be able to choose appropriate solutions for solving typical NLP sub problems (tokenizing, tagging, parsing).	Discussion Group work Lab work,	Lab tests
4.	To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data - corpora.	Would be able to analyze NLP problems to decompose them in adequate independent components.	Discussion Interactive session Applications	Written Test
5.		Would be able to become agile with NLP programming.	Lab work, assignments related to real-life scenarios	Lab tests, oral tests
6.		Would be able to get the gist of relevant research papers.	Interactive discussion, Lab work, Group work debate	presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓	✓								
2.	✓		✓							
3.	✓	✓					✓			
4.	✓	✓								
5.	✓	✓								
6.	✓		✓							

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	**Topics**
1	Welcome, motivations, what is Natural Language Processing, hands-on demonstrations. Ambiguity and uncertainty in language.
2	Chomsky hierarchy, regular languages, and their limitations. Finite-state automata. Practical regular expressions for finding and counting language phenomena.
3	An introduction to programming in Python. Why Python? Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. The NLTK (Natural Language Toolkit) with demonstrations.
4	Key algorithmic tool: dynamic programming, first a simple example, then its use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation.
CT-1	
5	CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each.
6	Efficient CFG parsing with CYK, another dynamic programming algorithm. Also, perhaps, the Early parser. Designing a little grammar, and parsing with it on some test data.

7	Introduction to probability theory-the backbone of modern natural language processing. Events, and counting. Joint and conditional probability, marginals, independence, Bayes rule, combining evidence. Examples of applications in natural language.
Midterm	
9	The concept of parts-of-speech, The Brown Corpus. Probabilistic (weighted) finite state automata. Hidden Markov models (HMMs), definition and use.
10	The maximum entropy principle, and its relation to maximum likelihood. Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks.
11	Probabilistic models for translating Bangla into English. Alignment, translation, language generation.
CT-2	
12-13	Automatically discovering verb subcategorization.
14	Sentiment analysis.
Final	

References : 1. NLP: The Essential Guide by Dotz
2. NLP: The New Technology of Achievement by Steve Andreas and Charles Faulkner.

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 425: Digital Signal Processing
Credit Hour	:	4.5
Pre-requisite (if any)	:	Differential Equations and Laplace Transforms; Matrices, Complex variable and Fourier Analysis
Course Synopsis	:	This course covers the techniques of modern digital signal processing that are fundamental to a wide variety of application areas. Upon completion of this course students will be able to perform commonly used signal processing operations. They will learn how to use a powerful general-purpose mathematical package such as MATLAB to design and simulate DSP systems. They will study digital signals in time domain, frequency domain etc. Special emphasis is placed on the architectures and design techniques for digital filters

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment:

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment tools**
1.	To introduce students with different types of signal and periodicity	Plot discrete-time signals, evaluate their energy and power, check for periodicity, and evaluate the period of a signal.	Interactive discussion	Written test
2.	To introduce the students with various kinds of systems	Will be able to determine a DT systems time-invariance, stability, causality, and linearity.	Interactive discussion	Written test.
3	To introduce students with convolution and Fourier transform.	Compute the linear and circular convolutions of discrete-time sequences. Evaluate the discrete-time Fourier transform (DTFT) of a sequence.	Interactive and group discussion	Written test, presentation.
4.	To introduce the students with different types of filters.	Will be able to design FIR and IIR filters by hand to meet specific magnitude and phase requirements.	Lab work	Lab test
5.	To introduce students with the transformations performed on signals such as Z-transform.	Will be able to perform Z and inverse Z transforms using the definitions, Tables of Standard Transforms and Properties, and Partial Fraction Expansion.	Interactive discussion	Assignment, written test.
6.	To provide a knowledge to work with standard LTI systems with specific magnitude, phase and frequency response	Will be able to use computers and MATLAB to create, analyze and process signals, and to simulate and analyze systems sound and image synthesis and analysis	Lab work	Lab test.

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓		✓							
2.	✓		✓							
3.	✓	✓	✓		✓		✓			
4.	✓	✓								
5.	✓									
6.	✓	✓	✓							

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-4	Discrete-time signals, evaluate their energy and power, periodicity
5-7	Time-invariance, stability, causality, and linearity.
1st Tutorial Examination	
8-12	Linear and circular convolutions, discrete time Fourier transform
Mid Term Examination	
13-16	Finite impulse response, infinite impulse response
Quiz Test	
17-20	Z-transform, inverse z-transform
2nd Tutorial Examination	
21-24	Poles and zeros, partial fraction expansion
Assignment	
Semester Final Examination	

References	:	1. Digital Signal Processing : Principles, Algorithms and Applications by Proakis-and-Manolakis
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code : CSE 471: Machine Learning
Credit Hour : 4.5
Pre-requisite (if any) : N/A
Course Synopsis : Machine Learning is the study of how to build computer systems that learn from experience. It will explain how to build systems that learn and adapt using real-world applications. Typical applications might be computer vision, speech recognition, machine translation, natural language processing, medical diagnosis, intelligent robots, and so on. This course provides a broad introduction to machine learning, data-mining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, Artificial neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, decision tree, language learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The objective of the course is to introduce students to state-of-the-art methods and modern programming tools for data analysis.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment Tools**
1.	To provide basic information about all the key concepts of machine learning and its applications	Would be able to understand the foundation of machine learning techniques and recognize the characteristics of machine learning that make it useful to real-world problems	Interactive discussion Real life example	Concept sharing, Written test and oral tests
2.	To introduce with different machine learning approaches of different genre	Would be able to learn about all the key concepts like feature selection, dimension reduction, principal component, data set division, confusion matrix etc.	Lecture Schedule Group work	Written test Oral test
3.	To instruct to evaluate the effectiveness of some machine learning approaches	Would be able to classify machine learning approaches into some primary categories like supervised learning, unsupervised learning, reinforcement learning etc.	Lecture Schedule	Written test Oral test
4.	To instruct to acquire the ability to find out the best suited approach for applying in a specific scenario	Would be able to understand some common machine learning approaches like regression, decision tree, Bayesian algorithm, artificial neural network, support vector machine, genetic algorithm etc.	Lecture Schedule Group lab work	Lab tests, Assignment
5.		Would be able to understand basic clustering algorithms and their applications to clustering analysis, probabilistic and generative learning models	Lecture Schedule Group lab work	Assignment, Lab tests

6.		Would be able to evaluate an approach calculating some key terms like accuracy, F-score, precision, specificity, sensitivity etc.	Lecture Schedule Group lab work	Written test, Assignment
7.		Would be able to critically compare, contrast and evaluate the different ML techniques in terms of their applicability to different Machine Learning problems using some tools like ROC curve etc.	Lecture Schedule Group work Lab work	Lab tests, Assignment
8.		Understand the advantages and disadvantages of the learning systems studied in the course, and decide which is appropriate for a particular application.	Group lab work	Project, Presentation
9.		Would be able to develop advanced programming framework that can process advanced approaches.	Lab work, assignments related to real-life scenarios	Lab tests, oral tests

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓		✓		✓					
2.	✓		✓							
3.	✓	✓			✓					
4.	✓	✓			✓					
5.	✓	✓			✓					
6.	✓	✓			✓					
7.	✓	✓			✓					
8.	✓	✓			✓					
9.	✓	✓			✓					

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule

Weeks	Topics
1	Introduction to machine learning, basic concepts
2-3	Supervised Learning: Decision tree, Neural Network, Regression
CT 1	
4-7	Support Vector Machine, Gaussian discriminant analysis. Naive Bayes.
Mid Term	
9-11	Unsupervised Learning: Clustering, K-means, PCA (Principal components analysis), ICA (Independent components analysis)
CT 2	
12-13	Genetic Algorithm, Hidden Markov Model,
Preparatory Leave	
Final	

References	:	1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition 2. Stephen Marsland, Machine Learning: An Algorithmic Perspective 3. Christopher M. Bishop, Pattern Recognition and Machine Learning
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	CSE 469: Bioinformatics Computing
Credit Hour	:	4.5
Pre-requisite (if any)	:	Algorithms
Course Synopsis	:	The course provides a brief review of some of the fundamental biological process and entities associated with them, such as the cell, genome, proteins, replication and transcriptions. Students will be introduced to the problems regarding the storage and analysis of biological data, and algorithms employed to solve these problems. The algorithms are analyzed in terms of performance and efficiency. The objective of this course is to develop the core concepts and prepare the students for future in-depth study and research in the field of bioinformatics.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment:

	Course Objectives	**Course learning outcomes**	**T-L activities**	**Assessment Tools**
1.	To introduce the students to fundamental biological processes such as DNA replication, transcription, translation.	Would be able to recall fundamental biological processes and outcomes	Interactive discussion, real-life examples	Written and oral test
2.	To enable the students to implement pattern matching algorithms	Would be able to make use of algorithms to solve problems related to genetic pattern matching	Lab work, assignments	Lab tests
3.	To enable the students to utilize alignment techniques	Would be able to compare multiple genome sequences using alignment algorithms	Lab work, assignments	Lab tests
4.	To introduce the problems with genome assembly and the algorithms employed to solve them	Would be able to reconstruct genomes from fragments using graph algorithms	Group lab work	Demonstration
5.	To familiarize the students with modern tools and software used to analyze biological data	Would be able to make use of widely used tools and platforms in bio-informatics	Lab work, assignments related to real-life scenarios	Lab tests, oral tests
6.	To implant ethical concerns among students regarding genetic modification	Would be able to perceive ethical concerns regarding genetic modifications	Interactive discussion, debate	presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	✓									
2.	✓	✓	✓							

3.	✓		✓							
4.	✓		✓		✓		✓			
5.	✓	✓	✓							
6.					✓	✓	✓			

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1-4	Introduction to bioinformatics, fundamental biological processes
5-7	Genetics, hereditary
CT 1	
8-12	Genetic pattern matching and hidden message finding
Mid Term Examination	
13-16	Sequence alignment, multiple sequence alignment
Assignment	
17-20	Genome assembly, kmer composition, paired composition, de bruijn graphs
2nd Tutorial Examination	
21-24	Combinatorial pattern matching, suffix tree
Semester Final Examination	

References : 1. Introduction to Bioinformatics Algorithms by Pavel Pevznar
2. Bioinformatics Algorithms - an Active Learning Approach by Pavel Pevznar and Phillip Compeau

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	MAT 112: Differential and Integral Calculus
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The purpose of this course is to give clear concept about several functions and their derivatives with geometrical representation, application of derivatives and related theorems in scientific problems. To introduce students to learn the various methods of integration in undergraduate level and to calculate the length of curves, of curved surfaces and volumes of solid revolutions.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment Tools**
1.	To facilitate the students giving concept of several functions, existence of limits. Geometric understanding of continuous and discontinuous functions, Increasing and decreasing behavior.	i) Ability to identify the several functions with their different graphical representation. Also will be able to recognize the intervals where the function has the Increasing and Decreasing behavior. ii) Ability to understand the existence of limiting value of function, to investigate the function is either continuous or differentiable at a point or not. If not continuous ability to classify the discontinuities.	Lecture, Group discussion, Problem solving (In the class), Problem solving (Home work)	Class Test, Written Exams (Mid Term & Final), Assignment, Presentation, Oral Test
2.	To illustrate the concept of the derivatives geometrically, derivative interpreted as the instantaneous rate of change and in solving various physical problems (like velocity, speed, acceleration etc.).	Capability to interpret the derivative of a function as the instantaneous rate of change in quality modeled to solve the physical problems.		
3.	To enable the students with skills to apply the derivative related General Theorems in various branches of applied science.	Will be able distinguish derivative oriented which theorem may be applied in different physical phenomena and to explain the consequences.		

4.	To arm the students to find the distance traversed by a particle along a curve, area of a region with curvilinear boundaries, volume of a solid cross-section using Integration method.	Demonstrate ability to find length of a curve, areas of regions and area between curves, volume of surface of revolution.		
5.	To equip the students with the knowledge of using the theorems of definite integrals (e.g. Beta function, Gamma function) to evaluate the tough definite integrals in easier form.	Demonstrate the quality to integrate more complicated function in most standard and easiest methods of integration.		
6.	To equip the students to acquire the ability to determine (explain) the judgment (logic) of the solution to the problem.	Achieve the quality to judge whether a proof or a solution to the problem are sound and can identify any error (if exists).		
7.	To facilitate the students to be able to communicate mathematics both orally and in well- written form to explain the solution.	Demonstrate an intuitive and computational understanding to explain the consequence of problems orally or in well-written form.		
8.	To qualify the students to be able to formulate any physical situation with a mathematical model like function, differential equation or an integral.	Achieve the ability to apply calculus at the undergraduate and postgraduate math related courses.		
9.		Can seek employment in the math related fields		

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.		✓	✓							
2.		✓	✓							
3.			✓							

4.		✓	✓							
5.		✓								
6.			✓		✓					
7.		✓			✓					
8.			✓		✓					
9.									✓	

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1--3	Functions: Several functions, Increasing and Decreasing functions, graphs of functions. Limits, Continuity and Differentiability of functions with problems.
4--5	Differential Coefficients: Differentiation of Explicit, Implicit and Parametric functions with problems.
6-7	Successive Differentiation: Definition, Use of De-Moivre's Theorem, Leibnitz's Theorem with problems.
8-9	General Theorems: Rolle's Theorem, Mean-value Theorem, Taylor's Theorem with remainder, problems and applications.
10	Several Indeterminate forms with problems.
Mid Term	
11-12	Partial Differentiation: Euler's Theorem on homogeneous function, Jacobians and its properties, several problems.
13-14	Maxima and Minima of one and two variables with problems and applications.
15	Tangent and Normal in Cartesian & Polar Coordinates with some problems.
16-20	Integration : Methods of Integration, Integration by parts, Special types of Integration, Integration by Reduction, Definite Integrals, properties of Definite Integrals, Gamma function and Beta function,
21-24	Rectification, Areas of plane curves, Volumes and Surfaces of solids of revolution.
Presentation and Viva-voce.	

References	:	1. Mohammad & Bhattacharjee - Differential Calculus 2. Mohammad & Bhattacharjee - Integral Calculus & Differential Equations 3. Das and Mukharjee - Differential Calculus 4. Das and Mukharjee - Integral Calculus
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	MAT 123: Differential Equations and Laplace Transforms
Credit Hour	:	3.0
Pre-requisite (if any)	:	Differential and Integral Calculus
Course Synopsis	:	The aim of this course is to introduce a variety of differential equations and their solutions, with emphasis on applied problems in engineering and physics. A number of analytical methods will be introduced to solve the first, second and higher order ordinary differential equations and also partial differential equations. This course will also introduce the theory of Laplace transforms and its applications to solve ordinary differential equations.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Learning Outcomes	T-L Activities	Assessment Tools
1.	Ability to develop knowledge and ideas of differential equations to formulate a variety of application based problems arising from biology, chemistry, physics and engineering.	Lecture, Demonstration, Real life example, Group work, Interactive Discussion, Problem Solving, Assignment.	Oral test, Quiz test, Written test, Assignment, Presentation.
2.	Ability to distinguish order, degree, ordinary, partial, linear, non-linear, homogeneous, non-homogeneous differential equations.		
3.	Ability to think critically by determining and using appropriate methods for solving a variety of ordinary differential equations. Solution techniques for nonlinear D. E. (5-6 problems).		
4.	Applying differential equation to solve heat equation, wave equation.		
5.	Ability to find the Laplace transform, inverse Laplace transforms of derivatives, integrals and periodic functions, etc, using the definition. Use of Translation theorems to find Laplace transforms.		
6.	Effectively write mathematical solutions of a differential equation in a clear and concise manner by using Laplace transform		

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the Course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.	✓									

3.	✓									
4.	✓									
5.	✓									
6.	✓									

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1-3	Family of Curves, Concept of Differential Equation (D.E.), Ordinary and Partial D.E., Order and Degree of D.E., Linear and Nonlinear ODE.
4-5	Application of D.E., Formulations of D.E..
Quiz Test	
6-8	Solution of a DE: First Order Exact ODEs, First Order Non-exact ODEs, Variables Separated From (V.S.F.), ODEs Reducible to V.S.F., First Order Homogeneous (F.O.H.) ODEs.
1st Tutorial Examination	
9-11	First Order Linear (F.O.L.) ODEs, ODEs Reducible to F.O.L., First Order Higher Degree (Non-linear) ODEs.
Mid Term Examination	
12-15	Higher order Linear D.E. with constant coefficient, Finding Particular Integral, Higher Order Homogeneous ODE, Partial Differential Equation
Assignment	
16-18	Concept of Laplace transformation, Laplace transform of various elementary functions.
2nd Tutorial Examination	
19-21	Inverse Laplace transform of various elementary functions.
22-24	Application of Laplace transforms to solve various types of ordinary differential equations.
Semester Final Examination	

References	:	1. Differential Equation by S. L. Ross. 2. A textbook on Integral Calculus with Differential Equation by Mohammad, Bhattacharjee and Latif. 3. Laplace Transforms by M. R. Spiegel (Schaum's Outline Series).
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	MAT 135: Matrices, Complex Variable and Fourier Analysis
Credit Hour	:	3.0
Pre-requisite (if any)	:	Differential and Integral Calculus
Course Synopsis	:	This course is an introduction to the properties of matrices, Complex Variables and Fourier Analysis. The operations on matrices with a wide variety of its applications will be discussed. This course also provides an introduction to complex variables. It introduces students to the complex numbers system and varieties of operations, differentiation, integration and problems that may arise within the context. Lastly, This course will introduce the general periodic functions and learn how to express them as Fourier series, which are sums of sines and cosines

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessments**
1.	To illustrate the concept of algebra of Matrices and its basic operations.	Ability to use matrix operations to solve the Assignment Problems, Decision Analysis, Equipment Replacement Problems, Theory of Competitive Games, and Queuing Models.	Lecture, Real life example, Problem solving, Group work, Interactive Discussion, Assignment, Home Work.	Written test, Assignment, Quiz, Oral test, Assignment.
2.	To facilitate students how to formulate a physical problem into a mathematical model in the form of linear equation and then solving by using Matrices.	Ability to apply matrix method to solve a physical (Life oriented) problem.		
3.	To enable the students to the concept of difference between real and complex number systems and planes.	Ability to differentiate between real and complex number systems and planes.		
4.	To introduce De Moivre’s and other relevant theorems and their applications	Applying De Moivre's and other theorems to get the roots of equations.		
5.	To overview about the Fourier series analysis and its application to signal processing.	Ability to implement Fourier series in signal processing.		

Mapping of Course LO and Generic Skills

Curriculum

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1		✓								
2		✓								
3		✓								
4		✓								
5		✓	✓							

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-2	Algebra of Matrices: Matrices, Transpose of a matrix, Square matrices, Powers of matrices, Polynomials in matrices, Invertible (Nonsingular) matrices, special types of square matrices, Complex matrices, and Block matrices.
2-3	Basic Operations: Matrix addition and Scalar multiplication, Matrix multiplication, Calculation of Inverse, Row-echelon form, Elementary row and column operations, Rank.
Quiz Test	
4-6	Simultaneous Linear Equations: Augmented matrix, Gaussian elimination method, Pivoting strategies, Gauss-Jordan elimination, and LU decomposition.
1st Tutorial Examination	
7-8	Determinants: Determinant of a square matrix, Minor, Cofactor, Inverse of a matrix using determinant, Pivotal condensation.
Mid Term Examination	
9-10	Vectors: Dimension, Linear dependence and independence, Linear combinations, Row and column rank.
11-12	Eigenvalues and Eigenvectors: Characteristic equations, Properties of eigenvalues and eigenvectors, Linearly independent eigenvectors, Cayley-Hamilton theorem.
Assignment	

13-15	Complex Numbers: The complex number system, Fundamental operations with complex numbers, Absolute value, axiomatic foundation of the complex number system, Graphical representation of complex numbers, Polar form of complex numbers, De Moivre's theorem, Roots of complex numbers, Euler's formula, Polynomial equations, The nth roots of unity, Vector interpretation of complex numbers, Dot and cross product, Complex conjugate coordinates.
2nd Tutorial Examination	
16-18	Complex Differentiation: The Cauchy–Riemann equations, Harmonic Functions, Singular points.
19-21	Complex Integration: Cauchy's theorem, Some consequences of Cauchy's theorem, Cauchy's integral formulas, The Residue theorem, Evaluation of integrals and series.
22-25	Fourier Series and its Applications: The need for Fourier series, Periodic functions, Piecewise continuous functions, Definition of Fourier series, Dirichlet's conditions, Odd and even functions, Half-range Fourier sine or cosine series, Parseval's identity, Uniform convergence, Integration and differentiation of Fourier series, Complex notation for Fourier series, Double Fourier series, Applications of Fourier series.
Semester Final Examination	

References :
1. Theory and Problems of Matrix Operations by R. Bronson (Schaum's Outline Series).
2. Linear Algebra by S. Lipschutz and M. Lipson (Schaum's Outline Series).
3. Complex Variables by M. R. Spiegel, S. Lipschutz, J. J. Schiller and D. Spellman (Schaum's Outline Series).
4. Fourier Analysis with Applications to Boundary Value Problems by M. R. Spiegel (Schaum's Outline Series).

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	MAT 216: Coordinate Geometry and Vector Analysis
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The purpose of this course is to give clear concept about coordinates of a point in two dimensional planes and in three dimensional space with related equations of pair of straight lines, various forms of conics represented by the general equation of second degree, algebraic operations of vectors, different operations of vector calculus with geometrical and physical interpretations, Integral theorems of vectors and using these in physical and real life problems.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessment Tools**
1.	To illustrate the concepts of change of Coordinates of a point & the equation of a curve for shifting the origin or the rotation of axes. Geometric representation of homogeneous quadratic equation.	Attain the quality to locate a point on the same plane but in different coordinates systems, variants and invariants for rotation of axes or shifting of origin, can interpret geometrically the homogeneous quadratic equation.	Lecture, Group discussion, Problem solving(in the class, homework)	Class test, Written Exams (Mid Term & Final), Assignment, Presentation, Oral test.
2.	To facilitates students to know different geometrical forms of conic represented by General equation of second degree.	Demonstrate the quality to distinguish the different forms of conic represented by general equation of second degree.		
3.	To give clear concepts about position of a point in three dimensional space, direction cosines and direction ratios , equation of plane in different forms & their properties, equations of straight lines in space etc.	Ability to explain the difference between coordinates of a point on a plane or in space, two dimensional & three dimensional straight lines and specify their existence by equations.		
4.	To facilitate students to understand the basic operations of vectors in two & three dimensional space, computation of scalar & cross product of vectors & their geometrical and physical interpretations.	Achieve the quality to calculate the scalar & vector products and can interpret the results of vector operations physically and geometrically. Code to use these methods.		

5.	To illustrate the concept of computing derivatives and integrals of vector functions, use of vectors in solving problems involving velocity, acceleration, force, work done and in the real life problems.	Capability to differentiate the vector functions and can calculate the velocity, acceleration of a moving particle and work done by a particle.		
6.	To facilitate students providing physical interpretation of Gradient, Divergence, Curl, Directional derivatives and related concepts. To help for ability to know the proper operation of Nabla in vector expressions.	Demonstrate the quality of proper using of Nabla in vector function and can calculate the Gradient, Divergence, Curl. Ability to explain rotational and solenoidal vector fields.		
7.	To arm the students with knowledge of computing Line Integral along piecewise smooth arc, interpret such quantities as work done by force.	Ability to calculate line and surface integrals and can Demonstrate physical interpretations.		
8.	To equip the students with skills to apply Green's theorem to evaluate linenintegrals, Stoke's theorem for vector integral along a boundary surface giving physical interpretation of curl. Quality to use Gauss's Divergence theorem transforming volume integral to surface integral.	Achieve the quality to interpret the various Integral theorems for simple closed curves, boundary surfaces and volumes.		
9.		Ability to apply the knowledge acquired in studding this course to computer graphics, multi-media, digital signal processing, digital image processing including computer lab oriented problems.		
		Achieve the ability to apply calculus at the undergraduate and postgraduate math related courses. Can seek employment in the math related fields		

Mapping of Course LO and Generic Skills:

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.		✓								
2.		✓								
3.		✓								
4.		✓	✓							
5.		✓	✓							
6.			✓				✓			
7.		✓			✓					
8.		✓	✓							
9.		✓	✓				✓			✓
10.								✓		

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-2	Vector Algebra: Addition and Subtraction of vectors, unit vector, position vector, vector and scalar field, Dot, Cross & Triple vector product, related problems.
3-5	Vector Calculus: Vector Differentiation and related problems, Gradient, Divergence and Curl and their physical interpretation, Directional Derivatives, Laplace's Equation, Poisson's Equation, related problems.
6-7	Vector Integration- Line integral, Surface integral & Volume integral and their physical interpretations, related problems.
8-10	Green's theorem in the plane, Gauss's Divergence theorem & Stoke's theorem.
Mid-term Exam	
12-13	Orthogonal Co-ordinate systems: Spherical and Cylindrical coordinates with physical significance.

14-16	Two Dimensional Geometry: Transformation of co-ordinates, Change of origin, rotation of axes, pair of straight lines, homogeneous quadratic equation, angle between two lines, parallelism and perpendicularity, equation of bisectors, problems.
17-18	General equation of second degree, Cartesian and Polar equations of conic, identification of conics.
19-20	System of Circles, angle of intersection of two circles, orthogonality , radical axis, Co-axial circles, point circles and limiting points. problems
21-22	Three Dimensional Geometry: Rectangular co-ordinates, direction cosines, direction ratios, projections, angle between two lines. Problems.
23-24	Planes: Equation of planes, intercept form, normal form, parallelism and perpendicularity. Problems.
25	General ideas of Spheres, Cylinders and Cones.

References : 1. Vector Analysis: M. R Spiegel.
2. Co-ordinate Geometry of two and three Dimensions: Mohammad & Bhattacharjee

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	MAT 235: Numerical Methods
Credit Hour	:	3.0
Pre-requisite (if any)	:	Differential Equations and Laplace Transforms; Matrices, Complex Variable and Fourier Analysis
Course Synopsis	:	The main purpose of the course is to introduce the fundamentals of numerical analysis that are mainly used in engineering. It deals with the theory and application of numerical approximation techniques as well as their computer implementation. It covers computer arithmetic, solution of nonlinear equations, interpolation, and approximation, numerical integration and differentiation, solution of differential equations, and matrix computation.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning Method**	**Assessment**
1.	To overview about numerical solutions and its necessity. Description of various errors involve in a solution and how to compute them.	a) Differentiate between analytic and numerical solutions and their uses. b) Compute absolute, relative, percentage errors and rate of convergences.	Lecture, Demonstration	Oral test.
2.	Introducing finite difference operators. Illustrate the concept of interpolation and methods of interpolation.	a) Concept on forward, backward, central, shift and average operator. b) Ability to approximate a function by interpolation technique by using Newton's and Lagrange's interpolation formula.	Real life example, Group work	Quiz test.
3.	Derive several numerical methods for solving an algebraic and transcendental equation. Introducing the algorithm of the methods	a) Apply numerical methods (such as: Bisection, Iteration, False position and Newton-Raphson) to solve algebraic and transcendental equations. b) Create a computer program to use a particular method.	Interactive Discussion, Problem Solving	Written test.
4.	To facilitate the numerical methods for solving a system of linear equations.	a) Apply Tri diagonal, LU Decomposition, Jacobi and Gauss-Seidel's method for solving a system of linear equation. b) Create computer code to use these methods.	Homework, Lab Work.	Presentation

5.	Introducing various methods for numerical differentiation and integration. Overview their algorithms.	a) Apply Newton's Forward and Backward polynomial for numerical differentiation. b) Apply Trapezoidal, Simpson's 1/3, Simpson's 3/8 rule for numerical integration. c) Create computer program for these methods.	Assignment, Lab work.	Lab Test
6.	Introducing Numerical methods for solving ordinary differential equations (ODE). Solution of IVP's and BVP's.	a) Use of Euler's method, Modified Euler's method, Runge-Kutta Method for solving an ordinary differential equations (ODE). b) Generate computer program for using these methods.	Problem solving, Lab work.	Lab test.

Mapping of Course LO and Generic Skills:

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.		✓								
2.		✓								
3.		✓	✓							
4.		✓	✓							
5.		✓	✓							
6.		✓	✓							

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1-3	Analytic and Numerical Solutions, Errors in a Numerical Computation, Exact and Approximate Numbers.
4-6	Finite Difference Operators, Interpolation, Newton's and Lagrange's Interpolation Formula.
1st Tutorial Examination	

7-11	Numerical Solution of Algebraic and Transcendental Equations, Bisection Method, Iteration Method, Newton-Raphson Method, False-Position Method.
Mid Term Examination	
12-15	Numerical Methods for solving a system of linear equations. Tridiagonal, LU Decomposition, Jacobi and Gauss-Seidel's method.
Quiz Test	
16-18	Newton's Forward and Backward polynomial for numerical differentiation.
2nd Tutorial Examination	
19-20	Trapezoidal, Simpson's 1/3, Simpson's 3/8 rule for numerical integration.
Assignment	
21-25	Euler's method, Modified Euler's method, Runge-Kutta Method for solving an ordinary differential equations (ODE).
Semester Final Examination	

References : 1. Introductory Methods of Numerical Analysis by S.S Sastry
2. Numerical Analysis for Scientists and Engineers: Theory and C Programs by Madhumangal Pal

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : PHY 111: Physics-I
Credit Hour : 3.0
Pre-requisite (if any) : N/A
Course Synopsis : This course introduces wave motion, frequency, amplitude, wavelength, and phase. Mechanical waves, types of waves, concept of wave front, traveling waves, sinusoidal waves, velocity, phase and phase constant, transverse and longitudinal waves.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning Method**	**Assessment**
1.	Students will get familiar with wave motion and the properties of waves.	After completing the course students will be able to describe wave motion and properties of wave	Interactive discussion	Oral test, Written test
2.	Students will get acquainted with Oscillation, oscillating system and Simple Harmonic Motion and related problems.	Students will describe simple harmonic motion, derive differential equations for SHM, and solve the equation and related problems.	Class Lecture, Assignment	Class test
3.	Students will be presented the idea of heat and thermodynamics.	Students will be able to describe thermodynamic systems, heat capacity, thermodynamic processes and laws of thermodynamics. They will be able to apply first law to different systems	Group discussion, Presentation	Quiz
4.	Students will get acquainted with the concept of heat capacity, thermodynamic processes and laws of thermodynamics.	Students will be able to derive second law of thermodynamics, calculate solve related problems, and apply the law for different types of heat engines, entropy, Carnot engine, efficiency of Carnot engine, related problem	Class lecture	Quiz
5.	Students will be introduced second law of thermodynamics, entropy. Carnot engine, efficiency of Carnot engine, related problem		Class lecture, Assignments	Assignment

Mapping of Course LO and Generic Skills:

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓									
2.		✓	✓							
3.	✓		✓							
4.			✓							✓

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Weeks	Topics
1-2	Wave motion, frequency, amplitude, wavelength, phase, phase velocity and constant
3-4	Mechanical waves, types of waves, concept of wavefront
5	Traveling waves, sinusoidal waves,
6	Transverse and longitudinal waves.
CT 1	
7-11	Oscillation, oscillating system, Simple Harmonic Motion (SHM),
8-9	Differential equation describing SHM.
Mid Term Examination	
10	Time period, angular frequency. Energy in SHM, application of SHM,
11	Simple pendulum. Equation of damped harmonic motion, forced oscillation and resonance
CT 2	
12	Thermodynamics, heat, specific heat, adiabatic, isothermal, isobaric processes,
13	Zeroth law, first law and second law of thermodynamics
14	Entropy. Carnot engine, efficiency of Carnot engine, related problems.
Semester Final Examination	

References	:	1. Physics, volume I, Halliday, Resnick & Krane
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	PHY 124: Physics-II
Credit Hour	:	3.0
Pre-requisite (if any)	:	PHY 111: Physics-I
Course Synopsis	:	This course introduces Electromagnetism, Coulomb's law, Gauss' law, Faraday's law, Lenz's law, Biot-Savart Law, Hall Effect, wave nature of light and the particle-wave duality and uncertainty principle, Modern Physics.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**Teaching Learning Method**	**Assessment**
1.	To provide students with a thorough understanding of the basic concepts of electricity, magnetism, Modern Physics and Optics.	The student has acquired knowledge of Electromagnetism (electric and magnetic force and field, circuits, induction), semiconductors and electromagnetic waves.	Interactive discussion	Oral test, Written test
2.	To instruct students of the fundamental laws of electricity and magnetism such as, Coulomb's law, Gauss law, Biot-Savart law, Ampere's law, Faraday's law.	The student has acquired knowledge of Light (interference and diffraction)	Class Lecture, Assignment	Class test
3.	To acquaint students with Modern physics, nature of matter and wave, Heisenberg Uncertainty principle.	The student has acquired knowledge of Modern Physics, the wave nature of light and the particle-wave duality and uncertainty principle.	Group discussion, Presentation	Quiz
4.	To increase the mathematical and computational sophistication so that students may apply advanced mathematical techniques and methods in solving problems.	The student can solve problems with moderate mathematical complexity related to Electric and magnetic force and field, electric charge, electric potential, current, voltage and resistance, capacitors.	Class lecture	Quiz
5.		The student can solve problems with moderate mathematical complexity related to Photo-electric effect, Compton effect, de Broglie wavelength.	Class lecture, Assignments	Assignment
6.		The student can solve problems with moderate mathematical complexity related to Application of Gauss' law, Faraday's law, Lenz's law, Biot-Savart Law, Hall Effect.	Class Lecture	Assignment, written test

Mapping of Course LO and Generic Skills:

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.			✓							
2.			✓							
3.			✓							
4.		✓								
5.		✓								
6.		✓								

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Weeks	Topics
1-2	Electromagnetism, electric charge, characteristics of electric charges, Coulomb's law,
3-4	Coulomb's law in vector form. Electric field, Electric Dipole, dipole moment, flux.
5	Flux of a vector field, electric field, Gauss's law
6	Applications of Gauss's law shell theorem
CT 1	
7-11	Numerical Solution of Algebraic and Transcendental Equations, Bisection Method, Iteration Method, Newton-Raphson Method, False-Position Method.
8-9	Conductor in electric field, current, current density, drift velocity. Ohm's law. Capacitors, practical use, calculating capacitance, energy storage, effect of dielectrics in capacitors.
Mid Term Examination	
10	Magnetic field, magnetic force on a moving charge, Lorentz force, Hall effect, Biot-Savart law, Ampere's law definition, explanation.
11	Application of Ampere's law. Faraday's law of induction, Lenz's law, motional emf. Eddy current.

CT 2	
12	Interference and Diffraction of light.
13	Modern physics, Photo-electric effect, Compton effect, de Broglie wavelength, nature of matter
14	Matter wave, Heisenberg Uncertainty principle, wave function
Semester Final Examination	

References	:	1. Physics, volume II, Halliday, Resnick & Krane
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	STA 215: Basic Statistics and Probability
Credit Hour	:	3.0
Pre-requisite (if any)	:	Differential and Integral Calculus
Course Synopsis	:	The main aim of this course is to introduce the students to the elementary statistical concepts with their applications. The course will be designed with a short introduction to the elementary concepts in Probability, essential to give a scientific foundation to Mathematical Statistics.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	**Course Learning Outcomes**	**T-L Activities**	**Assessments**
1.	Description of the structure and characteristics of statistical data. Graphical representation of data.	Ability to use knowledge for summarizing data sets including common graphical tools such as, histograms, bar diagrams, pie diagrams, and frequency Ogive.	Lecture, Demonstration, Real life example, Group work, Interactive Discussion, Problem Solving, Home Work, Assignment.	Oral test, Quiz test, Written test, Assignment, Presentation.
2.	Description of various measure of central tendency.	Ability to calculate arithmetic mean, geometric mean, harmonic mean, median, mode, quartile, Decile and percentile.		
3.	To Illustrate the requisites of good measure of dispersion and describe various measures of dispersion	Ability to calculate range, quartile deviation, standard deviation and coefficient of variation.		
4.	To facilitate Skewness, Kurtosis and solve mathematical problem by them.	Ability to use Skewness and Kurtosis to measure the symmetry in a distribution.		
5.	To equip with the concept of probability and introducing mathematical preliminaries of probability.	a) Students will be able to understand the significance of the connection between statistics and probability and their application in the real world. b) Use of basic counting techniques such as, multiplication rule, combinations, and permutations to compute probability and odds.		
6.	Introducing probability distribution and demonstrate mathematical form of various probability distributions.	Ability to use Binomial, Poisson and Normal distribution and solving mathematical examples with them.		

7.	To illustrate correlation and regression and their uses.	Ability to use correlation and regression to quantify the association between two quantitative variables.		

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	**Generic Skills* (Appendix-1)**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.		✓								
2.		✓								
3.		✓								
4.		✓	✓							
5.		✓								
6.		✓								
7.		✓	✓							

Lecture Schedule:

Lectures	**Topics**
1-3	Overview of statistical measurement, Definition of Statistics, Importance of Statistics, Scopes and limitations of Statistics.
4-6	Collection of data, Various diagram to represent statistical data.
Quiz Test	
7-8	Measures of central tendency: Arithmetic Mean, Geometric Mean, Harmonic mean.
1st Tutorial Examination	
9-11	Median, Mode, Quartile, Decile, Percentile.
11-13	Measure of Dispersion: Requisites of good Measure of Dispersion, Range, Coefficient of Variation, Quartile Deviation.

Mid Term Examination	
14-15	Skewness, Kurtosis.
16-18	Concept of Probability, Mathematical Preliminaries of Probability.
2nd Tutorial Examination	
19-21	Various mathematical problems related to probability, conditional probability.
22-24	Binomial, Poisson and Normal Distribution.
Assignment	
25-26	Regression and Correlation.
Semester Final Examination	

References : 1. Methods of Statics by K.C. Bhuyan.

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : GED 129: Functional Bangla
Credit Hour : 3.0
Pre-requisite (if any) : N/A

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	To introduce students with the fundamental concepts and methods of Bangla language and grammar.	Manipulate the language accurately to organize facts and ideas, and to present explanations, opinions and information in writing.	Lecture and Discussion	Q/A, Presentation
2.	To Apply grammatical rules with accuracy	Enable Flexibility in Bangla skills when communicating in writing and verbal.	Lecture and Discussion	Assignment, Presentation
3.	To ensure Appropriate formal style and tone in the target language	Enable students of all abilities to develop their Bengali language skills to their full potential, equipping them with the knowledge to communicate in a variety of contexts with confidence.	Lecture and Discussion	Q/A, MCQ
4.	To ensure Language conventions such as correct punctuation and accuracy in spelling	Translate English into Bengali.	Lecture and Discussion	Assignment, Q/A
5.	Translate Bengali into English.	Translate Bengali into English.	Lecture and Discussion	Q/A, Presentation
6.	Write official essays in Bengali.	Write official essays in Bengali.	Lecture and Discussion	Q/A, Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓		✓							✓
2.	✓									
3.	✓									
4.	✓									✓
5.	✓									✓
6.	✓									✓

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1-4	ধ্বনি (বাগযন্ত্র, বাংলা ধ্বনি ও উচ্চারণ স্থান), বর্ণ, শব্দ, পদ ও বাক্য সম্পর্কে ধারণা
5-8	বচন সম্পর্কে ধারণা ও বহুবচনবোধক শব্দগঠন, বিরাম চিহ্নের ব্যবহার, গনণবিধি
CT 1	
9-12	শব্দগঠনে রীতি, বিভক্তি ব্যবহার বিধি, বাক্য গঠন রীতি
Midterm	
14-16	যুক্তাক্ষর গঠন ও বর্ণের পরিবর্তিত রূম, পরিভাষা, সাধু, চলিত, আঞ্চলিক ও প্রমিত ভাষারীতি
17-19	উচ্চারণ রীতি ও উচ্চারণ সূত্র, বিরাম চিহ্নের ব্যবহার
CT 2	
20-23	অনুবাদ রীতি, অভিধান ব্যবহার বিধি, প্রতিবেদন রচনা ও দাপ্তরিক পত্ররচনা
24	Assignment and Presentation
25	Review of previous topics
Final	

References : 1. শব্দ সংকেত – জামিল চৌধুরী
2. বাংলা ভাষার ব্যাকরণ – জ্যোতিভূষণ চাকী
3. বাংলা উচ্চারণ অভিধান – নরান বিশ্বাস
4. বাংলা কী লিখবেন কেন লিখবেন – নীরন্দ্রেনাথ চক্রবর্তী সম্পাদিত
5. বাংলা শব্দের চালচিত্র – ফরহাদ খান
6. প্রমিত বাংলা বানানের নিয়ম – বাংলা একাডেমী
7. বাংলা ভাষার প্রয়োগ ও অপপ্রয়োগ – বাংলা একাডেমী
8. প্রায়োগিক ভাষাতত্বের ভূমিকা – মনসুর মুসা

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students : 1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	GED 219: Engineering Economics
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The course is designed for the students studying in engineering discipline who have little or no previous training of economics and to teach the students about the basic concepts and analytical tools in economics so that they can understand the operation of economic activities in a well fashioned manner.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	Introducing with different concepts of Microeconomics	Students will be able to understand different concepts of microeconomics such as Demand and Supply, Utility, Cost , Production etc.	Interactive discussion, real-life examples	Assignment
2.	Introducing with different concepts of Macroeconomics	Students will be able to understand several lessons of macroeconomics such as GDP, GNP, Inflation, Unemployment etc.	Interactive discussion	Assignment
3.	Computing depreciation of an asset using standard depreciation techniques to assess its impact on future and present value	Students will be able to assess depreciation of an asset using standard depreciation techniques.	Discussion Group work Assignment	Class Test
4.	Comparing the differences in economic analysis between the private and public sector	Students will be able to compare differences in economic analysis between the private and public sector.	Discussion, Group work	Assignment, Class test

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓			✓	✓	✓				
2.	✓		✓							
3.	✓	✓			✓		✓			
4.	✓	✓			✓					

Assessment Method	(%)
Class attendance	10
Class tests	20

Midterm Exam	30
Final Exam	40

Lecture Schedule:

Weeks	**Topics**
1	Introduction to Economics: Microeconomics
2	Demand, Supply
3	Utility
4	Cost
CT 1	
5	Production
6	Market
7	Time value of money
Midterm	
9	GDP and GNP
10	Analyzing the price level
11	Unemployment
CT 2	
12-13	Aggregate Demand and Supply
14	7th Five Year Plan of Bangladesh Government
Final	

References : 1. Microeconomics by Michal Parkin
2. Macroeconomics by Micheal Parkin

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students : 1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : GED 233: Bangladesh Studies
Credit Hour : 3.0
Pre-requisite (if any) : N/A

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessment
1.	To introduce students with rich history, culture and heritage of Bangladesh.	Demonstrate their sound basics in history, culture and heritage of Bangladesh.	Lecture, Discussion and Assignment	Assignment, Q/A, MCQ
2.	To providing them in-depth knowledge on the major political events that shaped Bangladesh as an independent sovereign state.	Develop an extensive knowledge of the major political events that led to the emergence of Bangladesh.	Lecture and Assignment	Assignment, Q/A
3.	To improve their understanding on political, economic and social development of Bangladesh.	Become politically conscious of the rights and privileges of oneself and of the fellow citizens.	Lecture, Discussion and Problem Based Exercise	Q/A, MCQ
4.	To increase understanding on the challenges and potentials of Bangladesh in shaping its peaceful and sustainable future.	Be oriented with the significant contributions of patriotic political leaders.	Lecture, Discussion and Problem Based Exercise	Assignment, Q/A, MCQ
5.	To demonstrate an understanding of historical concepts and skills and show awareness of conflicting interpretations of events.	Be able to motivate their next generations to the nationalistic ideals of Bangladeshi nation.	Lecture and Assignment/Presentation	Q/A, Assignment, Presentation
6.	To prepare students with knowledge to represent Bangladesh in any platform.	Be able to represent Bangladesh in a deserving manner.	Lecture, Group Discussion and Assignment	Q/A, Assignment, Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓							✓		✓
2.	✓			✓			✓			
3.		✓					✓			✓
4.		✓					✓	✓		
5.	✓	✓	✓							
6.		✓	✓		✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1	Physical Features of Bangladesh: Area and Location of Bangladesh, Natural Regions of Bangladesh- Deltaic Regions, Plateaus and Hill Ranges.
2-3	Geography and Climate: Tropic of Cancer, floods, tropical cyclones, tornadoes and tidal bores; deforestation, soil degradation and erosion, monsoon rains, climate change, arsenic in drinking water, fight against arsenic.
4-5	Biodiversity: sea coastline, rivers and tributaries, lakes, sea beaches, wetlands, forests, flora and fauna, mangrove forests of Sundarbans.
6-8	History of Bangladesh: Ancient Bengal: Janapadas of Ancient Bengal, the invasion of India by Greek hero Alexander, The Maurya Age of Bengal. Medieval Bengal: The Establishment of Muslim Rule in Bengal, Independent Sultan Rule in Bengal, Reasons for the decline of the Mughal Empire.
9-12	British Bengal: The Arrival of the Europeans, The causes of the Battle of Plassey, The causes of the fall of Nawab, Opposition to the British in different phases, Lahore Resolution and related issues. Emergence of Bangladesh: Formation of the Awami Muslim League, The Language Movement, The United Front, The Six-Point Movement, The Agartala Conspiracy Case, The mass uprising of 1969, The 1970 election, The Historic speech of 7 March by Bangabandhu, The Genocide of 25th March, The declaration of Independence, Mujibnagar Government, BirSresthas of our Liberation War 1971.
Midterm	
13	Administrative Structure : Divisions, Districts and Upazillas
14-16	Economy of Bangladesh: GDP, Sectoral Composition, Agriculture, Livestock and Fisheries of Bangladesh, Industries: Small, medium and large scale, Service Sector: Banking, Finance, Shipping, Transport, Communication, Telecommunication, Trade etc., Blue Economy: Its Potentials.
17-18	Demographic Composition of Population: Age Based, Gender Based, Background Based (Urban and Rural), Based on Ethnic and Religious Identities
19-20	Manpower of Bangladesh: Characteristics, potentialities.
21-22	Culture: Ethnic Diversity, Socio-cultural customs and traditions, Art and Culture, Social and cultural festivals. Literature, Health and Sports, National Flag and National Anthem, Religions in Bangladesh, Religious harmony, Media of Bangladesh.

23-24	Women Empowerment in Bangladesh: Female education in Bangladesh, Women in job sector, Women in Garments and other industries, Women in politics, Women in social decision making process.
25	Natural Disasters of Bangladesh: Floods, tidal bores, Drought, cyclones, earthquakes etc., Review of previous topics
Final	

References :
1. Bangladesh and Global studies for 'A' level by NCTB
2. History of Bangladesh & World Civilization for 'A' level by NCTB
3. Bangladesh Studies and Culture by Dr. Sumon Das, Human Publications, 7th Edition, 2016.

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code : GED 321: Accounting
Credit Hour : 3.0
Pre-requisite (if any) : N/A

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	To encourage to think in a new and more creative way when analyzing or forecasting financial information.	Will be able to explain and recognize elements of financial statements and record transactions using double entry system	Lecture, Discussion and Assignment	Assignment, written exam, MCQ
2.	To introduce new tools common to financial statement analysis and how to use them in practical applications.	Able to analyze and record transactions, prepare accounting adjustments, construct financial statements, and close the books for the accounting period.	Lecture and Assignment	Assignment, written exam
3.	To assess the basic accounting concept, accounting principles & techniques of posting basic business changes.	Able to analyze critically reflect on financial reporting and accounting practice from an ethical and a global perspective, and respect ethical standards.	Lecture	Case Study, written exam
4.	To know the procedure of recording, handle and summarizing accounting data, prepare basic financial statements for merchandising operations, understand the basic accounting of long lived assets, short-lived assets, liabilities, natural resources and intangible assets.	Will be able to identify and apply principles and regulations relating to financial accounting and the preparation of financial statements	Lecture, Discussion and Problem Based Exercise	Assignment, written exam, MCQ, Case study
5.	To be aware of basics of International Financial Reporting Standards.	Will be able to communicate confidently and accurately to a high professional standard and employ technology effectively for communicating accounting information	Lecture and Presentation	written exam, Assignment
6.	To interpret accounting information for internal and external decision making.	Able to work either individually or in a group to solve problems and communicate understanding of issues relating to the preparation of financial statements	Lecture, Group Discussion and Assignment	Case study, Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.							✓			✓
2.	✓			✓		✓				
3.		✓			✓			✓		
4.				✓						
5.			✓				✓			
6.			✓			✓			✓	

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	**Topics**
1-2	Define Accounting. Who uses Accounting Data? Types of Accounting, Accounting Concepts & Conventions, GAAP.
3-5	Basic Accounting Equation: Assets, Liabilities, Transaction Analysis, Summary of Transactions, Business problem and solution
6-9	Journal: Debits and Credits, Golden Rules of Account, rules of double entry, Summary Illustration of Journalizing.
10-12	Summary Illustration of Posting from Journal to Ledger, T – Accounts, Preparation of a Trial Balance, Limitations of a Trial Balance.
Midterm	
13	Review of Mid-Term Exam (Discuss strengths and weaknesses and provide guidance for better performance in future)
14-15	Periodic & perpetual inventory recording system
16-18	Timing Issues, The Basics of Adjusting Entries, Adjusting journal, The Adjusted Trial Balance, Business problem.
19-20	Using a Worksheet, Closing the Books, Summary of the Accounting Cycle, practice on business problem.

21	Presentation
22-24	Income Statement, Balance Sheet, and Owner's equity statement (Services & Merchandise concern) Problem solution from annual report on different business organization.
25	Review of previous topics
Final	

References	:	1. Accounting Principles by Weygandt, Kieso, and Kimmel, Latest Edition (latest edition) 2. Fundamental Accounting Principles by Larson, Wild ad Chiapetta
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	GED 421: Industrial Management
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The course provides a brief overview for the students of engineering background to understand the industrial environment & its relationship with competitors and stakeholders (customers, suppliers, employees, the society at large and so on), industrial operations, organization & human resource management, innovation & entrepreneurship, leadership, strategic planning, marketing, cost-volume-profit analysis, accounting &; bookkeeping, finance (supply &; use of capital), cash-flow analysis, investment appraisal, management control, and costing are the key matters in industrial management.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	Explain the concept and application of business strategy in an industrial organization.	Be able to understand leadership, organizing, strategic planning, and management control functions for different situations in an industrial company.	Interactive discussion, Case Study	Assignment, Class Test
2.	Interpret, analyze and design the different financial context of an industrial organization.	Be able to study and analyze the financial reports, income statement, balance sheet, cash flow statement and key measures of industrial companies.	Interactive discussion, Presentation, Case Study	Assignment, Class Test
3.	Discuss the structure of the industrial company in business aspect.	Be able to explain how the industry deals with its internal and external environment.	Interactive discussion, Case Study	Assignment, Class Test
4.	Introduce & Implement decision support system with proper business strategy in different situations of industrial company.	Be able to explain how the industrial company should act in markets and price its products in real business scenario.	Interactive discussion, Presentation, Case Study	Assignment, Class Test
5.	Connect industrial management to the future area of work.	Be able to understand that how strategic planning, management, entrepreneurship, organization, production and learning work in an industrial company.	Interactive discussion, Case Study	Assignment, Class Test
6.	Demonstrate how the knowledge of industrial management relate to the objectives of the industrial organization	Be able to describe how management control of results, action, people and culture functions in an industrial company.	Interactive discussion, Presentation, Case Study	Assignment, Class Test

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓	✓								
2.	✓		✓							
3.	✓	✓			✓		✓			
4.	✓	✓			✓					
5.	✓	✓								
6.	✓	✓			✓					

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lectures	Topics
1	Business and its objectives, prerequisites of successful business, Industry and its types, interrelationship between industry, commerce and trade Forms of industrial ownership- sole proprietorship, partnership, company, cooperatives, public sector enterprises and different types of industries.
2	Management and its objectives, Functions and levels of management, types of manager, Roles of management, Management skills, principles of management.
3	Kinds of organizational plan, Time frames for planning, Contingency planning, Tactical & Operational planning, Decision making process.
4	Decision making condition, Barriers to goal setting and planning, Overcoming the barriers, Chain of command, Span of supervision.
CT 1	
5	Organization and organizing, types of organizational structure, departmentalization. Job design: job specialization and job rotation.
6	Job enlargement and job Enrichment. Authority delegation process, reasons and problems of delegation, Centralization and decentralization.
Midterm	

8	Definition of motivation, Early theories of Motivation, Who are leader and what is leadership? Early Leadership Theories.
9	Purpose and types of control, Steps in the control process, characteristics of effective control, Resistance to control, Overcoming to resistance, Operation and financial control, structural and strategic control.
10	Operation, production and manufacturing, Characteristics of OR, Task of OR manager & Production manager.
11	Phases of OR, Inventory and purchasing management, Just in time method, Capacity, Layout planning.
CT 2	
12-13	Project and its objective, project characteristics, Project Life Cycle, Functional manager Vs Project manager, Selecting project manager, Criteria for project selection, Nature of project selection model, Project planning, Estimating project budget etc.
Assignment	
Preparatory Leave	
Final	

References : 1. Management- Griffin
2. Management- Robbins & coulter
3. Total Quality Management- L.Suganthi & Samuel
4. Operation & Production Management- krajewski & Ritzman

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	GED 431: Business Communication
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	The course provides a brief review of communication and how this communication will help the CSE graduates in starting their own business. Students will learn about various elements of communication, models of communication, and all other basic concepts. This course also includes business letter writing, report writing, developing CV, agenda & minutes of a meeting writing.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	To improve communication skills for both personal and business success.	Understand the fundamental principles of effective business communication.	Lecture, Discussion and Assignment	Assignment, Q/A, MCQ
2.	To modify communication depending on business situation and circumstances.	Apply the critical and creative thinking abilities necessary for effective communication in today's business world.	Lecture and Assignment	Assignment, Q/A
3.	To habituated with advanced interpersonal communication, etiquette and relationship building skills.	Organize and express ideas in writing and speaking to produce messages suitably tailored for the topic, objective, audience, communication medium and context.	Lecture	Q/A, MCQ
4.	To make familiar with the communication technique effectively across cultures and to a range of different business audiences (managers, clients, customers ,colleagues)	Demonstrate clarity, precision, conciseness and coherence in your use of language.	Lecture, Discussion and Problem Based Exercise	Assignment, Q/A, MCQ
5.	To develop business projects and communication strategy.	Communicate with stakeholders by using different modes of communication.	Lecture and Assignment/ Presentation	Q/A, Assignment, Presentation

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓			✓					✓	
2.	✓				✓			✓		✓

3.		✓			✓					
4.		✓		✓				✓		
5.	✓			✓						

Assessment Method	**(%)**
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Lecture	**Topics**
1-3	Definition, Communication process, elements of communication, importance & objectives of communication in business
4-6	Nature & types of communication model; Difference, Significance, Usefulness & limitation of communication models.
CT 1	
7-8	Communication principles- Clarity, Consideration, Courtesy, Completeness, Conciseness, Correctness.
9	Sender & receiver related barriers, overcoming the barriers to improve communication.
10-12	Intrapersonal and Interpersonal communication; Small and Mass communication, Formal and informal communication; Internal and external communication; Upward, downward & Horizontal communication; media of communication etc.
Midterm Examination	
14-15	Written vs. Oral Communication, merits & demerits of Oral and written communication, face to face communication.
Assignment and Presentation	
16-17	E-Commerce, Internet, EDI, Media and terms used in E. Communication
18-19	Definition & Characteristics, Types of nonverbal communication, Types of charts and diagrams.
20-21	Purpose and style of speaking, Developing formal speech & presentation, How to be an effective speaker and listener.
CT 2	
22-24	C.V. Application, Business Letter, Company Meetings, Notice, Minutes & Agenda Writing, review of previous topics
Semester Final Examination	

References	:	1. Dr. Abdul Awal khan & Dr. M.A. Taher: Business Communication & Report Writing 2. Business Communication, by – Margeret Richards, NCC Education 3. Excellence in Business Communication, 3rd Edition by- Thill. John V. 4. Essentials of Business Communication by- Pal. Rajendra and Koriahale. J.
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	ENG 114: Communicative English Language I
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	This course is the first of the two courses focused on developing the learners' communication skills. It covers basic to intermediate lessons on speaking, writing, reading and listening. Basic grammatical rules are taught alongside other lessons so that the learners can speak and write correct English. Articles, flash fiction, audio clips and other quality course materials are provided to facilitate authentic learning.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	Develop the learners' speaking, writing, listening and reading skills	Speak and write grammatically correct sentences	Participation of Students, Assigned Readings. Questioning Formative Quizzes, Problem-solving, Free writing, Small Group activities	Formative Test (Progressive Test (written); Oral Test; Quiz) -Summative Test (Mid-term Examination; Final Examination) -Other Strategies: (Quick Summaries; Open-ended Questions; Assignment; Class Tests; Interviewing students; Oral Presentations; Self-grading)
2.	Teach them to write job application, CV, and formal emails	Understand spoken language and written texts;		
3.	Make sure that they can effectively communicate in academic, professional, and social situations	Write formal letters, job application, CV, official emails, and notice;		
		Deliver academic and professional presentations in English;		
		Demonstrate richer vocabulary and use appropriate words;		
		Demonstrate overall improvement in communication skills;		
		Demonstrate their close-reading and interpretative skills;		
		Apply the skills and knowledge that are acquired through assignment preparation, such as basic research skills, awareness of research ethics, and ability to meet the deadline;		
		Actively and fruitfully engage in teamwork, as learnt through group tasks.		

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1	✓				✓					
2	✓				✓					
3					✓					
4					✓					
5					✓					
6					✓					
7	✓				✓					
8	✓	✓			✓	✓		✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Week	Topics
1	Overview of sentence structure, Tenses: affirmative, negative, interrogative
2	Sequence of tenses, Passives: passive sentences and embedded passive in active sentences
3	Articles and Determiners
4	Writing Paragraph, Preparing verbal answers to given questions/speech on a given topic
5	Preparing verbal answers to given questions/speech on a given topic (continued), Reading articles from magazines and newspapers, learning vocabulary, summarizing, answering questions
6	Prepositions, sub-verb agreement
Midterm Examination	

7	Gerund, infinitive and participle, Preparing speech for presentation at meetings, covering introduction, agenda setting, other issues, and conclusion based on the provided samples (from BBC learning English and other resources)
8	Preparing speech for presentation at meetings (continued), Writing job application and CV
9	Listening to given audio clips/audio stories (accompanied by their transcripts) and preparing verbal and written answers to given questions on these clips/stories.
10	Adjective and Adverb
11	Learning idiomatic expressions and phrasal verbs
12	Review of the previous classes and preparing for the Final Exam
Semester Final Examination	

References : 1. Thomson, A.J. and A. V. Martinet. A Practical English Grammar. Oxford University Press
2. Ahmed, Sadruddin. Learning English the Easy Way.

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Course Code	:	ENG 115: Communicative English Language II
Credit Hour	:	3.0
Pre-requisite (if any)	:	N/A
Course Synopsis	:	This course is a follow-up to English Language I. It covers advanced lessons on all four language skills including writing formal letters, emails, argumentative essays, preparing presentation speech, and listening to audio clips. Important grammar items are also taught alongside these lessons

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment

	Course Objectives	Course Learning Outcomes	T-L Activities	Assessments
1.	Further develop the learners' speaking, writing, listening and reading skills following the completion of English Language I	Speak and write grammatically correct sentences	Lecture, Group Discussion, Individual assignment, Group assignment, Question answer	Formative Test (Progressive Test (written); Oral Test; Quiz) -Summative Test (Mid-term Examination; Final Examination)
2.	Teach them to write official letters and emails, short reports, and notices;	Understand spoken language and written texts;		
3.	Make sure that they can effectively communicate in academic, professional, and social situations.	Write formal letters, job application, CV, official emails, and notice;		
		Deliver academic and professional presentations in English;		
		Demonstrate richer vocabulary and use appropriate words;		
		Demonstrate overall improvement in communication skills;		
		Demonstrate their close-reading and interpretative skills;		
		Apply the skills and knowledge that are acquired through assignment preparation, such as basic research skills, awareness of research ethics, and ability to meet the deadline;		
		Actively and fruitfully engage in teamwork, as learnt through group tasks.		

Curriculum

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1.	✓				✓					
2.	✓				✓					
3.					✓					
4.					✓					
5.					✓					
6.					✓					
7.	✓				✓					
8.	✓	✓	✓	✓	✓	✓		✓	✓	
9.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Week	Topics
1	Making Wh- Question, uses of Modals, changing Parts of Speech
2	Direct and Indirect Speech, reading articles and excerpts from various resources, learning vocabulary, paraphrasing, preparing verbal and written answers to given questions
3	Writing Formal Letters and Emails, freehand Writing: Short Notes, common Errors
Midterm Examination	
4	Simple, Complex and Compound sentences, and uses of Conjunctions, degrees of Adjective, reading sample dialogues and practicing conversation in groups

5	Preparing sample speech for academic and professional presentation/demonstration, and learning useful phrases/expressions related to presentation, language for official meetings covering introduction, agenda setting, asking for suggestions and feedback, other issues, and conclusion, listening to audio clips (accompanied by their transcripts) and preparing verbal and written answers to the given questions on the clips.
6	Freehand Writing: Argumentative/Analytical Essays (structuring the essay, cohesion and coherence, giving arguments, and improving language), writing Short Report, review of the previous classes
Semester Final Examination	

References	:	1. Swan, Michael. Practical English Usage. Oxford University Press 2. Ahmed, Sadruddin. Learning English the Easy Way 3. Baugh, L. Sue et al. How to Write First-Class Business Correspondence
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).
Conditions for Students	:	1. Assignments must be submitted on time 2. Any excuses for re-class test and re-mid is strongly prohibited 3. Must attend at least 70% classes to appear at the final examination

Course Code	:	MIS 525: System Analysis and Design
Credit Hour	:	3.00
Pre-requisite (if any)	:	N/A
Course Synopsis	:	To introduce the students with Information Systems and provide an overview of principles, methods and techniques of Information systems development, deployment using Object oriented analysis & design practicing Agile methodologies.

Mapping of Course Objectives, Learning Outcomes, Teaching Learning and Assessment :

	Course objectives	Course learning outcomes	Teaching learning activities	Assessment
1	To introduce the students with Information Systems and provide an overview of principles, methods and techniques of Information systems development, SDLC, role of System analyst and CASE tools.	a) Define information systems analysis and design & discuss the modern approach to systems analysis and design b) Describe the role of the systems analyst in information systems development & the information systems development life cycles (SDLC), of the role of computer-aided software engineering (CASE) tools in systems development.	Lectures, Assignment	Quizzes, Presentation
2	To illustrate and equip them with different Patterns and their practices.	Describe Practice Strategy, Observer, Factory, Singleton, Command, Adapter, Facade, Template Method, Iterator, Composite, State, Proxy, Compound Patterns.	Lectures, Assignment	Quizzes, Presentation
3	To demonstrate Analysis Modeling	a) Understand Steps of system analysis, Feasibility study, Economic and technical analysis, System specification, the elements of analysis model, Data modeling, Functional modeling and information flow, Behavioral modeling, Mechanics of structured analysis, Data Dictionary.	Lectures, Demonstration, Group work, Assignment	Quizzes, Presentation
4	To illustrate them IS design and modeling to represent common business situations.	a) Understand Design principles, Design Concepts, effective modular design, design heuristics, Data Design, Architectural Design process, Transformation mapping, Transaction mapping, and interface design, human-computer interface design, procedural design and create work products.	Lectures, Demonstration, Group work, Assignment	Quizzes, Presentation

5	To facilitate students to develop an IS through the process of coding, testing, deployment using Object oriented analysis & design practicing Agile methodologies.	a) Describe the process of coding, testing, and installing an organizational information system and outline the deliverables and outcomes of the process. b) Describe Object-Oriented Analysis and Design c) Practice Agile Methodologies.	Lectures, Demonstration, Group work	Quizzes, Presentation, Project Development

Mapping of Course LO and Generic Skills

Learning Outcome (LO) of the course	Generic Skills* (Appendix-1)									
	1	2	3	4	5	6	7	8	9	10
1	✓	✓	✓							
2	✓		✓	✓		✓	✓			✓
3	✓		✓	✓		✓	✓			✓
4	✓		✓	✓		✓	✓			✓
5	✓		✓		✓	✓	✓			✓

Assessment Method	(%)
Class attendance	10
Class tests	20
Midterm Exam	30
Final Exam	40

Lecture Schedule:

Week(s)	Topics
1	Introduction to Information systems modern approach to systems analysis and design Information systems development life cycles (SDLC), CASE tools in systems development.
2,3	Design Patterns: Strategy, Observer, Factory, Singleton, Command, Adapter, Facade, Template Method, Iterator, Composite, State, Proxy, Compound Patterns.
CT 1	
4	Steps of system analysis, Feasibility study, Economic and technical analysis, System specification, the elements of analysis model, Data modeling
5	Functional modeling and information flow, Behavioral modeling, Mechanics of structured analysis, Data Dictionary.
CT 2	

6	Review of previous classes
Mid Term Exam	
7-9	Design principles, Design Concepts, effective modular design, design heuristics, Data Design, Architectural Design process, Transformation mapping, Transaction mapping, interface design, human-computer interface design, procedural design.
CT 3	
10-12	Object-Oriented Analysis and Design: s: association, class diagram, event, object, object class, operation, sequence diagram, state, state transition, Unified Modeling Language, and use case, concepts and principles underlying the object-oriented approach. Requirements model using use-case diagrams, object model using class diagrams, state and sequence diagrams.
13	Process of coding from design and analysis model, testing, and installing an organizational information system and outline the deliverables and outcomes of the process. Agile Methodologies.
Presentation	
Semester Final	

Grading System : As per the approved Grading scale of Metropolitan University (appendix-2).

Conditions for Students :
1. Assignments must be submitted on time
2. Any excuses for re-class test and re-mid is strongly prohibited
3. Must attend at least 70% classes to appear at the final examination

Appendices

Appendix A: Generic Skills

Serial Number	Generic Skills
1	Intellectual skills
2	Practical and Problem solving skills
3	Scientific and Analytical skills
4	Entrepreneurship and Innovation skills
5	Communication & IT skills
6	Values, Ethics and Morality
7	Teamwork and Leadership skills
8	Professionalism
9	Social skills and responsibilities
10	Lifelong Learning skills

Appendix B: Grading Policy

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

Appendix C: Final Year Thesis/Project and Viva Marking Scheme

Two courses are offered in final semester, CSE 435 is a 4 credit course which is the final year project or thesis and CSE 436, a 2 credit course for final year Viva.

Final year project or thesis marking scheme is as followed:

Section	Mark
Project Proposal	10
Software Requirement Specification	30
Demo Presentation	15
Final Presentation	20
Total	75

The 100 mark total is used to generate the final grade.

The 10 mark of project proposal is confined to the supervisor only. Software Requirement Specification is a document which is given to 4 to 5 teachers to judge and then their marks are averaged. Two presentation sessions are held for the candidates, demo and final. In the demo session the students demonstrate their project and teachers suggest them updates if necessary. In the final session, students update their project according to the suggestions of demo session.

Viva voce is held in front of all the faculty members. The teachers ask the students subjective questions from the courses passed in last four years. The viva is graded in 100 marks.

Appendix D: Rubric for PowerPoint and Oral Presentation

	Awesome 4	**Admirable 3**	**Acceptable 2**	**Unacceptable 1**
Critical Thinking	Thoughtfully and accurately interprets results, shows in-depth understanding of major ideas	Identifies relevant arguments, justifies results, offers reasons	Usually justifies results and offers reasons	Misinterprets data, Unjustified arguments
Information and Organization	Covers topic thoroughly, includes details	Includes essential information, includes some supporting details	Includes most essential information. Details are missing	Lacks essential information
	Well organized. Topics are in logical sequence. Clear introduction & conclusions	Organized. Some topics are out of logical order. Clear Conclusions.	Some organization. Topics jump around. Unclear conclusions.	Not organized. Topics make no sense
Grammar & Spelling	All grammar and spelling are correct	Only one or two errors	More than two errors	Grammatical error Spelling errors
Visual Design	Visually appealing, clean simple layout, text is easy to read, graphics enhance understanding of ideas	Visually attractive, text is easy to read, colors enhance readability, graphics and special effects do not distract from understanding ideas	Text is sometimes hard to read, sometimes graphics or special effects distract from understanding	Text is difficult to read. Cluttered layout Confusing
Oral Presentation	Well prepared. Speaks clearly. Makes eye contact with audience, Delivers with ease, Invites questions	Well Prepared. Speaks Clearly. Make some eye contact. Occasionally looks at the screen. Invites questions	Clear and understandable. Limited delivery techniques. Reads more from the screen then to look at the audience	Not clear, not understandable
If it is a team project, then the following points are considered				
Teamwork	Thoughtfully and accurately interprets results, shows in-depth understanding of major ideas	Identifies relevant arguments, justifies results, offers reasons	Usually justifies results and offers reasons	Misinterprets data, Unjustified arguments

Appendix E: Minutes of the Departmental Curriculum Review Meeting

Departmental Meeting Minutes

Metropolitan University

Department : Dept of C.S.E.
Date & Time : 25th January, 2018; 12:30 pm
Location : IQAC Seminar Room

The following faculty members were present:

1. Prof. Choudhury Mukammel Wahid, Head
2. Mahfujul Hasan, Assistant Professor
3. Rashedul Islam, Assistant Professor
4. Nazmin Akhter, Senior Lecturer
5. Naima Ahmed Fahmi, Senior Lecturer
6. Ehsan R. Chowdhury, Lecturer
7. Abdul Al Azmain, Lecturer
8. Arif Ahmed, Lecturer
9. Sharif Ahmed, Lecturer
10. Jagot Jyoti Dey, Teaching Assistant
11. Munshi Fahim Sadi, Lecturer
12. Summit Haque, Lecturer
13. Sharmistha Dutta, Lecturer
14. Sakhawat Hossain Saimon, Lecturer
15. Tanzira Najnin, Lecturer

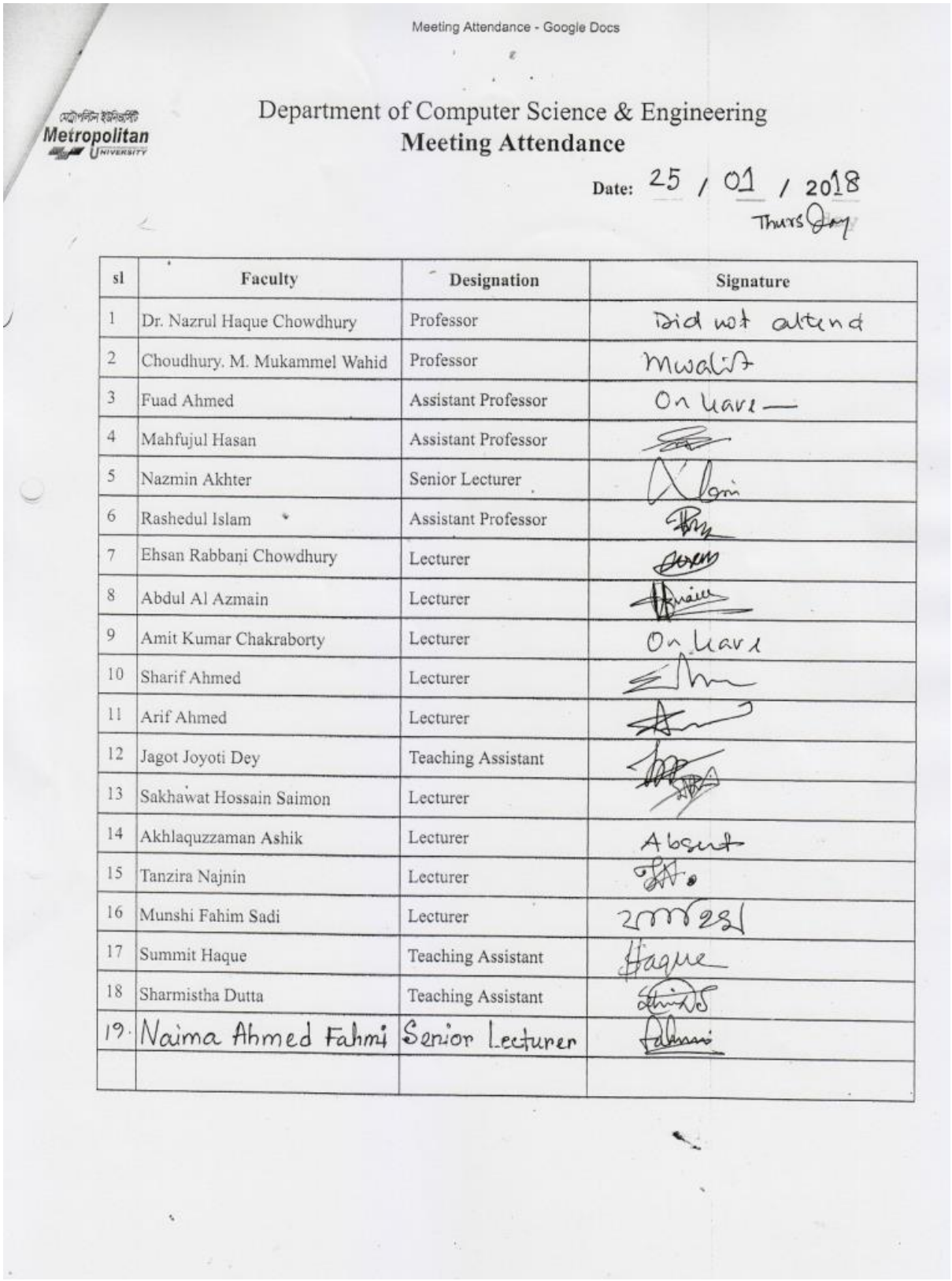
Agenda:

1. Review the minutes of the Last meeting.
2. Final year project (P400) supervision, marking scheme
3. Lab retake fee
4. Issues on scores of prerequisite courses
5. Publications & Departmental Assessment Report
6. Miscellaneous

Meeting Summary:

1. It is decided to mark a student separately between Project and Course-viva.
2. It is proposed to make a committee for the P400 course of a student. The committee will be of 4 members including supervisor, co-supervisor and 2 or 3 members. The marking scheme will be finalize in the next meeting.
3. It is decided to start P400 from 4/2 and supervisors will be selected randomly (lottery)
4. It is suggested that supervisors should actively drive students during the progress of the project. Student and supervisor should maintain a logbook, where every meeting with the supervisor should be recorded and signed by both student+supervisor.
5. Teachers should hold students accountable and everyone should be sincere to attend the viva and presentation, particularly senior faculty members.
6. It is decided to request the authority to introduce retake fees for labs and projects.
7. Students can't enroll in a course if they do not pass the prerequisite course. It is however, can be relaxed if the course teacher allows the student based on the result of an exam. A course teacher can take this Course Prerequisite Exam and may allow student who failed in a pre-requisite course.
8. Every faculty members are requested to to share their list of publications of 2017.
9. Faculties who are taking Computer Technology course are requested to ensure the development of computer literacy (Office Applications) of every student.
10. Every course teacher are requested to take at least a presentation in a term with formal attire.

The chairman thanked everyone and ended the meeting.



Meeting Attendance - Google Docs

মেট্রোপলিটন ইউনিভার্সিটি
Metropolitan University

Department of Computer Science & Engineering
Meeting Attendance

Date: 25 / 01 / 2018
Thursday

sl	Faculty	Designation	Signature
1	Dr. Nazrul Haque Chowdhury	Professor	Did not attend
2	Choudhury. M. Mukammel Wahid	Professor	Mwahid
3	Fuad Ahmed	Assistant Professor	On leave
4	Mahfujul Hasan	Assistant Professor	
5	Nazmin Akhter	Senior Lecturer	
6	Rashedul Islam	Assistant Professor	
7	Ehsan Rabbani Chowdhury	Lecturer	
8	Abdul Al Azmain	Lecturer	
9	Amit Kumar Chakraborty	Lecturer	On leave
10	Sharif Ahmed	Lecturer	
11	Arif Ahmed	Lecturer	
12	Jagot Joyoti Dey	Teaching Assistant	
13	Sakhawat Hossain Saimon	Lecturer	
14	Akhlaquzzaman Ashik	Lecturer	Absent
15	Tanzira Najnin	Lecturer	
16	Munshi Fahim Sadi	Lecturer	
17	Summit Haque	Teaching Assistant	Haque
18	Sharmistha Dutta	Teaching Assistant	
19.	Naima Ahmed Fahmi	Senior Lecturer	

Appendix F: Proposed Final Year Thesis/Project Marking Scheme

Thesis/Project Marking Scheme							
		Examiner					
Section	**Grading Area**	**Supervisor**	**Member 2**	**Member 3**	**Member 4**	**External**	**Total**
Before Final Presentation	SRS/Proposal	2.5	2.5	2.5	2.5		**10**
	Assessment	30					**3**
	Report	5	5	5	5		**20**
Final Presentation	Project Content	2	2	2	2	2	**10**
	Presentation	2	2	2	2	2	**10**
	Oral Defense	4	4	4	4	4	**20**
							100

Exam Committee of Final Year Thesis/Viva*	
Member	**Description**
Member 1	Project/Thesis Supervisor
Member 2	Co-supervisor (if any, else senior faculty)
Member 3	A senior faculty
Member 4	A senior faculty
Member 5	External (if available)

** Head of the Department will form the committee and select members in consultation with the supervisor.*

Appendix G: Minutes of the Academic Council Meeting

মেট্রোপলিটন ইউনিভার্সিটি
Metropolitan University

Ref: MU-Syl/Admin-4/2018/20(024)

30 April, 2018

Minutes of the Academic Council Meeting (26th) held at 3 PM on 26th April, 2018.

A meeting of the Academic Council (26th) of Metropolitan University, Sylhet, was held at 3.00 PM on Thursday, the 26th April 2018 in the Conference Room of the University. Professor Shiba Prasad Sen, Vice Chancellor In Charge of the University presideed over the meeting.

The following members were present in the meeting.

01. **Professor Shiba Prasad Sen**
    Pro-Vice Chancellor
02. **Professor M. Rabiul Hossain Ph D**
    Dean, School of Law
    Member, Dean Category
03. **Professor Md. Taher Billal Khalifa Ph D**
    Dean, School of Business & Economics
    Member, Dean Category
04. **Professor Suresh Ranjan Basak Ph D**
    Dean, School of Humanities and Social Sciences and Head, Department of English
    Member, Dean Category
05. **Professor Md. Nazrul Haque Chowdhury Ph D**
    Dean, School of Science and Technology
    Member, Dean Category
06. **12. Professor Nandalal Sharma**
    Head, Department of Bangla
    Member, Head Category
07. **Mr. Miah Md. Asaduzzaman**
    Assistant Professor & Head, Department of Electrical and Electronic Engineering
    Member, Head Category
08. **Mr. Md. Masud Rana**
    Assistant Professor & Head, Department of Business Administration
    Member, Head Category
09. **Mr. Fuad Ahmed**
    Assistant Professor & Head, Department of Computer Science and Engineering
    Member, Head Category
10. **Mr. Gazi Saiful Hasan**
    Assistant Professor & Head, Department of Law and Justice
    Member, Head Category
11. **Mr. Anik Biswas**
    Assistant Professor & Head, Department of English
    Member, Head Category

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12. **Professor Md. Abdul Aziz**
Professor Emeritus, Department of Economics
Metropolitan University, Sylhet
Member

13. **Professor Mohammed Jahirul Islam, Ph D, PEng**
Coordinator, Department of EEE
Member

14. **Barrister M. Arash Ali**
Professor, Department of Law & Justice
Member

15. **Professor Syed Manzoorul Islam Ph D**
Department of English, University of Dhaka
Member- nominated by the Board of Trustees.

16. **Mr. Muhammad Fazlur Rabb**
Member-Secretary & Registrar, Metropolitan University, Sylhet

The members who could not remain present for their pre-engaged schedule in and outside Bangladesh and illness were:

01. **Professor Md. Saleh Uddin, Ph D**
Vice Chancellor
Chairman

02. **Dr. Toufique Rahman Chowdhury**
Chairman, Board of Trustees
Member, Nominated by the Board of Trustees

03. **Mr. Tanwir M O Rahman Chowdhury**
Director, Institute of Business and Information Technology, Sylhet
Member, Dean Category

04. **Professor Muhammad Rafiqul Islam Ph D**
Professor, Department of Business Administration
Metropolitan University
Member

05. **Professor Dr. M.A. Ahbab**
Director and Head of Medicine, Parkview Medical College & Hospital, Sylhet
Member, Nominated by the Board of Trustees

06. **Professor Yasmeen Haque Ph D**
Department of Physics
Shahjalal University of Science and Technology, Sylhet
Member, Nominated by the Syndicate

07. **Professor Muhammed Zafar Iqbal Ph D**
Department of Computer Science and Engineering (CSE)
Shahjalal University of Science and Technology, Sylhet
Member, Nominated by the Syndicate

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The meeting began with welcoming of the members present by the Chairman.
Thereafter the Discussion started.

Agenda 1. Condolence on death of Late Suparna Basak, wife of Professor Suresh Ranjan Basak Ph D, Dean, School of Humanities and Social Sciences. She passed away on 25th March 2017.

The Academic Council mourned the untimely death of Late Suparna Basak, wife of Professor Suresh Ranjan Basak Ph D, Dean of School of Humanities and Social Sciences. She passed away on 25th March 2017. As a mark of respect, a brief profile of the deceased personality was read out for the information of the members present. The Academic Council prayed for the salvation of the departed soul and conveyed condolence to the members of the bereaved family.

Agenda 2. Condolence on death of Late Selina Ahmed Onu, wife of Mr. Chowdhury Mufad Ahmed, Additional Secretary, Ministry of Education and Syndicate Member, Metropolitan University, Sylhet. She passed away on 4th April 2018.

The Academic Council mourned the untimely death of Late Selina Ahmed Onu, wife of Mr. Chowdhury Mufad Ahmed, Additional Secretary, Ministry of Education and Syndicate Member, Metropolitan University, Sylhet. She passed away on 4th April 2018. As a mark of respect, a brief profile of the deceased personality was read out for the information of the members present. The Academic Council prayed for the salvation of the departed soul and conveyed condolence to the members of the bereaved family.

Agenda 3. Complimenting Professor Syed Manzoorul Islam, Member of the Academic Council, the Syndicate and the Board of Trustees, Metropolitan University on being awarded with Ekushey Padak, 2018.

The Academic Council complimented Professor Syed Manzoorul Islam, Member of the Academic Council, the Syndicate and the Board of Trustees, Metropolitan University on being awarded with Ekushey Padak, 2018. The members highlighted the contribution of Professor Syed Manzoorul Islam to education, literature and social development of the nation, and presented him a bouquet of flowers as a mark of respect and good wishes. Besides, a brief profile of the distinguished personality was read out for the information of the members present. Professor Syed Manzoorul Islam thanked the Academic Council for the way he was complimented.

Agenda 4. Endorsement of the Minutes of the last Academic Council meeting (25th) held on 2nd December 2017.

The Minutes of the 25th Academic Council meeting were read out and the decisions on the issues concerned were reported to have been recorded and implemented properly. Thereafter, the agendas were approved.

The agendas of 25th Academic Council meeting were as follow:

Agenda 1. Confirmation of the Minutes of the last Academic Council meeting (24th) held on 26th August 2017.

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Agenda 2. Intimation of the IQAC Activity Report as monitored by QAC.
Agenda 3. Approval of the Academic Calendar for Spring, Summer and Autumn terms of 2018.
Agenda 4. Approval of Examination Committees of different Departments.
Agenda 5. Review and approval of list of students who graduated /completed degrees from 27th August 2017 to 30th November 2017.
Agenda 6. Extension of registration of students of different Departments of the University. (From 27th August 2017 till date).
Agenda 7. Miscellaneous
7.1 : Innovation Hub
7.2 : Reference of Supplementary and Retake Examinations in transcripts
7.3 : Teachers' Motivation and Training
7.4 : Attendance of Teachers and employees
7.5 : Dress Code for teachers
7.6 : Student Evaluation

Agenda 5. Formation of the Department of Physics under the School of Science & Technology.

The Academic Council discussed the agenda formation of the Department of Physics under the School of Science & Technology at length. The advantages and disadvantages, and the availability of manpower came under consideration for discussion.
After a detailed discussion, the agenda was approved.

Agenda 6. Formation of the Department of Mathematics under the School of Science & Technology.

The Academic Council discussed the agenda formation of the Department of Mathematics under the School of Science & Technology at length. The advantages and disadvantages, and the availability of manpower came under consideration for discussion.
After a detailed discussion, the agenda was approved.

Agenda 7. Formation of the Department of Bangla under the School of Humanities and Social Sciences.

The Academic Council discussed the agenda formation of the Department of Bangla under the School of Humanities and Social Sciences at length. The advantages and disadvantages, and the availability of manpower came under consideration for discussion.
After a detailed discussion, the agenda was approved.

Agenda 8. Approval of Examination Committees of different Departments.

The agenda was considered and approved.

Agenda 9. Review and approval of list of students who graduated/completed degrees (1st December 2017 to 18th April 2018).

A total of 220 students completed undergraduate and graduate degrees from different programmes of six departments of the University from 1st December 2017 to 18th April 2018. The list of these 220 students was placed before the Academic Council for approval.
The agenda was considered and approved.

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Agenda 10. Extension of registration of students of different Departments of the University. (From 26th November 2017 till date).

The registration period of some students expired as they failed to complete their degrees in time for various reasons. These students belonging to different departments prayed for extension of registration at different times, applying from 26th November 2017 till date.
The agenda was considered and approved.

Agenda 11. Approval of the Curriculum Committee of the Department of English

The agenda was considered and approved.

Agenda 12. Approval of the Updated Curriculum of the Department of English.

Mr.Anik Biswas, Assistant Professor and Head, Department of English briefed the Academic Council about the salient features of the updated Curriculum of the Department of English.
Thereafter the agenda was approved.

Agenda 13. Approval of the Updated Curriculum of the Department of Computer Science and Engineering.

Mr. Fuad Ahmed, Assistant Professor and Head, Department of Computer Science and Engineering briefed the Academic Council about the salient features of the updated Curriculum of the Department of Computer Science and Engineering.
Thereafter the agenda was approved.

Agenda 14. Miscellaneous (If any).

14.1 : Unusual Queue of students in Retake and Supplementary Examinations.
The Academic Council was informed of the Unusual Queue of students in Retake and Supplementary Examinations of some students as a sample study. After a threadbare discussion, it was decided that students with insignificant performance in terms of credits in relation to time spent should be advised in an intensive mode so that they can enhance their concentration on their studies and complete the degrees as early as possible. The Academic Council further decided that the guardians of students with too minimum performance should be called and briefed about the situations concerning the performance of their wards. The guardians may be requested to take care of their wards to such an extent as can be helpful for them to concentrate on their studies and complete the degrees as early as possible.

14.2 : Checking of Admission of students to next term.
The Academic Council was informed of the situation where some students despite not being qualified for admission to the next term are getting themselves admitted with the payment of semester and tuition fees. After a threadbare discussion, it was decided that appropriate measures should be taken with the coordinated efforts of the Office of the Controller of Examinations, the Accounts Section and the departments so that only eligible students are admitted to the next term.

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14.3 : Holding of Supplementary Examinations during Final Examinations of terms.
Mr. Md. Masud Rana, Assistant Professor and Head, Department of Business Administration raised the issue and opined that holding of Supplementary Examinations during Final Examinations of terms creates problems in some ways. Since there is a provision for holding Supplementary Examinations after about six weeks of Final Examinations of terms, holding of Supplementary Examinations during Final Examinations of terms may be discontinued for making things easy including documentation of results. After a threadbare discussion, it was decided that holding of Supplementary Examinations during Final Examinations of terms would continue to facilitate students, particularly those who have completed all the courses excepting the ones pending to be completed through Retake and Supplementary Examinations.

As there was no other issue for discussion, the Chairman thanked the members present and concluded the meeting.

Professor Shiba Prasad Sen
Vice Chancellor In Charge
Chairman

Copy to:
1. Chairman, Board of Trustees
2. Vice Chancellor
3. Pro-Vice Chancellor
4. Treasurer
5. Vice Chairman, Board of Trustees
6. Members of the Syndicate
7. Members of the Academic Council
8. Professor Emeritus Md. Abdul Aziz
9. Deans- SoL, SoB&E, SoH&SS, SoS&T
10. Registrar
11. Controller of Examinations
12. Proctor
13. Director (Planning & Development/ Finance/ Administration/ Student Welfare/ IQAC)
14. Heads of Departments (CSE / EEE / BA / Econ/ English / L&J)
15. Deputy Registrar/ Deputy Director (Finance and Accounts)/ Deputy Controller of Examinations
16. Assistant Registrar
17. Assistant Librarian
18. Public Relations Officer
19. Members of the Proctorial Committee
20. All Teachers
21. All Officials
22. For Kind information: Director (Private University Division), University Grants Commission of Bangladesh, Agargoan, Sher-e-Bangla Nagar, Dhaka.
23. Office File.

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