METROPOLITAN UNIVERSITY, SYLHET
DEPARTMENT OF Computer Science & Engineering
COURSE OUTLINE

Program	:	Bachelor of Computer Science & Engineering(CSE)
Course Title	:	Differential Equations and Laplace Transforms
Course Code	:	MAT-123
Semester	:	Summer 2020
Credit Hour	:	3
Level	:	3.1
Course Teacher	:	Suhel Ahmed, Assistant Professor
Class Hours/ Consultation Hours	:	Sat: 5.00-8.00, R-Google Classroom;
e-mail	:	suhel@ metrouni.edu.bd
Mobile	:	+8801723976961
Pre-requisite(if any)	:	Differential and Integral Calculus
Course Objectives	:	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.
Course Learning Outcomes		Upon successful completion of this course, student will be able to: 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. 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.

Teaching-learning and Assessment Strategy: Minimum attendance:

Class Attendance and Participation		10	60% class attendance is mandatory for a student in order to appear at the final examination.
Mid-Term Exam		30	
Class Performance			
Class Tests / Quiz	10		
Assignments/Presentation	10		
Class Performance Total		20	
Final Exam		40	
Grand Total		100	

Grading and other Policies:

- Grading will be performed as prescribed by Metropolitan University
- Any excuses for re-class test and re-mid is strongly prohibited
- Class tests and quizzes will be administered at the beginning or end of certain class periods over the materials covered in each session.
- All test dates are subject to change and all revisions to the schedule will be announced in the class. It is the student's responsibility to be aware of any changes announced if he/she is absent from the class.

Class Rules:

- If you are late entrance, do not ask for permission to get into the class, get in without interrupting the class
- If you enter into the class room after 5 minutes, you are not allowed in attendance for the day
- You must bring your suggested text book to your class every day.
- Cell phones MUST be muted during the class and exam hours.

Tentative Class Schedule and Lesson Outcomes:

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
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.
Assignment	
25-26	Review
Semester Final Examination	

Reference Books:

1. **Differential Equation by B D Sharma.**
2. Differential Equation by S. L. Ross
3. A textbook on Integral Calculus with Differential Equation by Mohammad, Bhattacharjee and Latif.
4. Laplace Transforms by M. R. Spiegel (Schaum's Outline Series).

Grading System: As per the Approved Grading Scale of Metropolitan University

Numeric Grade	Marks Range	Letter Grade	Grade Point	Remarks
80% and above	80 – 100	A+	4	Outstanding
75% to less than 80%	75 – 79	A	3.75	Excellent
70% to less than 75%	70 – 74	A-	3.5	Very Good
65% to less than 70%	65 – 69	B+	3.25	Good
60% to less than 65%	60 – 64	B	3	Above Average
55% to less than 60%	55 – 59	B-	2.75	Average
50% to less than 55%	50 – 54	C+	2.5	Below Average
45% to less than 50%	45 – 49	C	2.25	Poor
40% to less than 45%	40 – 44	D	2.00	Pass
Less than 40%	00 – 39	F	0.00	Fail