MATH 101 – Engineering Mathematics I

Course Code	Course Name	Semester	
MATH 101	Engineering Mathematics I	Fall ☒ Spring ☐ Summer ☐	
Hours		**Credit**	**ECTS**
Theory	**Practice**	**Lab**	

Course Details	
Department	
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☒ Elective ☐
Lecturer (s)	
Course Objectives	The basic objective of Calculus is to relate small-scale (differential) quantities to large-scale (integrated) quantities. This is accomplished by means of the Fundamental Theorem of Calculus. Students should demonstrate an understanding of the integral as a cumulative sum, of the derivative as a rate of change, and of the inverse relationship between integration and differentiation.
Course Content	Functionsi Limit and Continuity, Derivative, Applications of Derivative, Integral, Applications of Integral, Transcendental Functions
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☐ Discussion ☐
Prerequisites/ Corequisites	The prerequisites are high school algebra and trigonometry

Work Placement(s)	

Textbook/References/Materials

Textbook(s): G.B Thomas, J. Hass, M.D.Weir, C. Heil*, Thomas' Calculus,* 14th Edition*,* (Pearson Global Edition)
R.A. Adams*, Calculus*: A complete course 8-th revised ed. , Prentice Hall, 2013.
J. Stewart, *Calculus*, Metric Version, Eighth Edition, 2016, Cengage Learning
References:

- Materials:

Course Category				
Mathematics and Basic Sciences	☒		Education	☐
Engineering	☒		Science	☒
Engineering Design	☒		Health	☒
Social Sciences	☐		Profession	☐

Weekly Schedule

No	Topics	Materials/Notes
1	Functions of a Single Variable	
2	Limit and Continuity	
3	Limit and Continuity	
4	Derivatives	
5	Derivatives	
6	Derivatives and Applications	
7	Derivatives and Applications	
8	Midterm Exam	
9	Integration	
10	Integration	
11	Integration and Applications	
12	Integration and Applications	
13	Transcendental Functions	
14	Integration techniques	
15	L'Hopital's Rule	
16	Final Exam	

Assessment Methods and Criteria

In-term studies	Quantity	Percentage
Attendance	-	-
Lab	-	-
Practice	-	-
Fieldwork	-	-

Course-specific internship	-	-
Quiz/Studio/Criticize	-	-
Homework	-	-
Presentation / Seminar	-	-
Project	-	-
Report	-	-
Seminar	-	-
Midterm Exam	1	40
Final Exam	1	60
	Total	**100%**
Contribution of Midterm Studies to Success Grade	1	40
Contribution of End of Semester Studies to Success Grade	1	60
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	16	4	64
Lab	-	-	-
Practice	-	-	-
Fieldwork	-	-	-
Course-specific Work Placement	-	-	-
Out-of-class study time	16	3	48
Quiz/Studio/Criticize	-	-	-
Homework	-	-	-
Presentation / Seminar	-	-	-
Project	-	-	-
Report	-	-	-
Midterm Exam and Preparation for Midterm	1	15	15
Final Exam and Preparation for Final Exam	1	20	20
Total Workload			**147**
Total Workload / 25			
ECTS Credit			

Course Learning Outcomes	
No	**Outcome**
L1	Use both the definition of derivative as a limit and the rules of differentiation to differentiate functions.
L2	Sketch the graph of a function using asymptotes, critical points, and the derivative test for increasing/decreasing and concavity properties
L3	Set up max/min problems and use differentiation to solve them.
L4	Set up related rates problems and use differentiation to solve them.
L5	Evaluate integrals by using the Fundamental Theorem of Calculus

	Apply integration to compute areas and volumes by slicing, volumes of revolution, arclength, and surface areas of revolution. Evaluate integrals using techniques of integration, such as substitution, inverse substitution, partial fractions and integration by parts. Set up and solve first order differential equations using separation of variables. Use L'Hôpital's rule.

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11					Total
L1																
L2																
L3																
L4																
L5																
															Total	

i. Sufficient knowledge in the fields of mathematics, natural sciences, and related engineering disciplines; the ability to apply theoretical and practical knowledge in solving complex engineering problems.

ii. The ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.

iii. The ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.

iv. The ability to select and use modern techniques and tools required for the analysis and solution of complex problems encountered in engineering applications; the ability to effectively use information technologies.

v. The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of complex engineering problems or discipline-specific research topics.

vi. The ability to work effectively in intra-disciplinary and multidisciplinary teams; the ability to work independently.

vii. The ability to communicate effectively both orally and in writing; proficiency in at least one foreign language; the ability to write effective reports, understand written reports, prepare design and production reports, make effective presentations, and give and receive clear and understandable instructions.

viii. Awareness of the necessity of lifelong learning; the ability to access information, track developments in science and technology, and continuously renew oneself.

ix. Acting in accordance with ethical principles, knowledge of professional and ethical responsibilities, and the standards used in engineering applications.

x. Knowledge of business practices such as project management, risk management, and change management; awareness of entrepreneurship and innovation; knowledge of sustainable development.

xi. Knowledge of the impact of engineering practices on health, environment, and safety at global and societal levels, and awareness of contemporary engineering issues; awareness of the legal consequences of engineering solutions.