OSTIM TECHNICAL UNIVERSITY
FACULTY OF ECONOMICS AND ADMINISTRATIVE SCIENCES
BUSINESS ADMINISTRATION DEPARTMENT
COURSE SYLLABUS FORM

MATH 103 Mathematics I							
Course Name	**Course Code**	**Period**	**Hours**	**Application**	**Laboratory**	**Credit**	**ECTS**
Mathematics I	MATH 103	1	3	0		3	6

Language of Instruction	English
Course Status	Compulsory
Course Level	Bachelor
Learning and Teaching Techniques of the Course	Lecture, Question-Answer, Problem Solving

Course Objective

This course covers the basics of Calculus which is required to be used in economic analysis. The course includes functions and models, limits and derivatives, differentiation rules, integral applications and techniques, and finally, further integration applications. The main aim of the course is to introduce several methods and techniques of Calculus to enable the students to use them in economic analysis. The course is designed to enhance students' ability to integrate mathematics into economic analysis to improve quantitative research skills and research.

Learning Outcomes

The students who succeeded in this course will be able;

1. To master the basic concepts of Calculus in the literature,
2. To comprehend basic methods and techniques of Calculus,
3. To utilize methods and techniques of Calculus in economic analysis
4. To integrate analytical concepts into economic analysis,
5. To think critically while using mathematics in several real-life and economic problems
6. To evaluate and enhance data for making effective economic analysis

Course Outline
This course will begin with a review of algebra, analytic geometry, functions, and trigonometry at an introductory level. This two-week part aims to understand whether the students are ready to take Calculus to expand their knowledge. This part is important for students to understand whether their high school studies are well enough to sustain this course. Then, the course will skip to the real part and the introduction of functions and models will be introduced to make a basis for limits and derivatives. Then, in the fifth week, limits and derivatives will be taught. In the sixth and seventh weeks, two major topics; namely, differentiation rules and applications, will be introduced to further expand the calculus knowledge of the students. The week of eight is for the midterm exam. By the ninth week, integral, its applications, and its techniques will be taught until the fifteenth week. Last week will be for problem-solving including whole topics and is expected to be a preparation for the final exam in which students will be responsible for whole topics taught in the course. In addition to this, problem-solving sessions will be held once per two weeks during the semester. Upon necessity, several quizzes could be organized to hold students' interests alive in the course.

Weekly Topics and Related Preparation Studies		
Weeks	**Topics**	**Preparation Studies**
1	Course Introduction (Diagnostic: Algebra, Analytic Geometry, Functions and Trigonometry)	– Why do we need Maths for Economics? – What is Calculus? – Introduction to the course – Course Syllabus and requirements
2	Diagnostic: Algebra, Analytic Geometry	– Are we ready to begin Calculus? – Review of Algebra – Review of Analytic Geometry – Problem Solving
3	Diagnostic: Functions, Trigonometry	– Review of Functions – Review of Trigonometry – Problem Solving
4	Functions and Models	– Four Ways to Represent a Function – Mathematical Models: A Catalog of Essential Functions – New Functions from Old Functions – Exponential Functions – Inverse Functions and Logarithms

5	Limits and Derivatives	– The Tangent and Velocity Problems – The Limit of a Function – Calculating Limits Using the Limit Laws – The Precise Definition of a Limit – Problem-solving session – Continuity – Limits at Infinity; Horizontal Asymptotes – Derivatives and Rates of Change – The Derivative as a Function
6	Differentiation Rules	– Derivatives of Polynomials and Exponential Functions – The Product and Quotient Rules – Derivatives of Trigonometric Functions – The Chain Rule – Implicit Differentiation – Derivatives of Logarithmic Functions – Rates of Change in the Natural and Social Sciences – Exponential Growth and Decay – Related Rates – Linear Approximation and Differentials – Hyperbolic Functions – Problem-solving session
7	Applications of Differentiation	– Rates of Change in the Natural and Social Sciences – Exponential Growth and Decay – Related Rates – Linear Approximation and Differentials – Hyperbolic Functions – Problem-solving session
8	**MIDTERM EXAM**	
9	Applications of Differentiation	– Graphing with Calculus and Calculators – Optimization Problems – Newton's Method – Antiderivatives – Problem-solving session
10	Integrals	– Areas and Distances – The Definite Integral – The Fundamental Theorem of Calculus – Indefinite Integrals and the Net Change Theorem – The Substitution Rule

11	Applications of Integration	– Areas Between Curves – Volume – Volumes by Cylindrical Shells – Work – Average Value of a Function – Problem-solving session
12-13	Techniques of Integration	– Integration by Parts – Trigonometric Integrals – Trigonometric Substitution – Integration of Rational Functions by Partial Fractions – Strategy for Integration – Integration Using Tables and Computer Algebra Systems – Approximate Integration – Improper Integrals – Problem-solving session
14	Further Applications of Integration	Arc Length Area of a Surface of Revolution Applications to Physics and Engineering Applications to Economics and Biology – Probability
15	Problem Solving	Problem-solving including all topics
16	**FINAL EXAM**	

Textbook(s)/References/Materials:

Textbook:
James Stewart (2018). Calculus: Early Transcendentals, 8th edition

Supplementary References:
R. A. Barnett, M. R. Ziegler, K. E. Byleen (2015). Finite Mathematics for Business, Economics, Life Sciences, and Social Sciences, 13th ed., Prentice-Hall. Gilbert Strang (1991). Calculus, MIT. Available at: https://ocw.mit.edu/ans7870/resources/Strang/Edited/Calculus/Calculus.pdf

Other Materials:

Assessment		
Studies	**Number**	**Contribution margin (%)**
Attendance		
Lab		
Class participation and performance	1	10
Field Study		
Course-Specific Internship (if any)		
Quizzes / Studio / Critical	5	10
Homework		
Presentation		
Projects		
Report		
Seminar		
Midterm Exam/Midterm Jury	**1**	**30**
General Exam / Final Jury	**1**	**50**
Total		**100**
Success Grade Contribution of Semester Studies		**50**
Success Grade Contribution of End of Term		**50**
Total		**100**

ECTS / Workload Table			
Activities	**Number**	**Duration (Hours)**	**Total Workload**
Course hours (Including the exam week): 16 x total course hours)	16	3	48
Laboratory			
Application			
Course-Specific Internship (if any)			
Field Study			
Study Time Out of Class	16	3	48
Presentation / Seminar Preparation	1	1	1
Projects	1	3	3
Reports			
Homework			
Quizzes / Studio Review	5	1	5
Preparation Time for Midterm Exams / Midterm Jury	**2**	**20**	**40**
Preparation Period for the Final Exam / General Jury	**1**	**40**	**40**
Total Workload	**(181/30 = 6,03)**		**181**

Course' Contribution Level to Learning Outcomes						
Nu	**Learning Outcomes**	**Contribution Level**				
		1	**2**	**3**	**4**	**5**
LO1	To master the basic concepts of Calculus in the literature					X
LO2	To comprehend basic methods and techniques of Calculus					X
LO3	To utilize methods and techniques of Calculus in economic analysis					X
LO4	To integrate analytical concepts into economic analysis					X
LO5	To think critically while using mathematics in several real-life and economic problems					X
LO6	To evaluate and enhance data for making effective economic analysis					X

	Relationship Between Course Learning Outcomes and Program Competencies (Department of Management Information Systems)							
Nu	**Program Competencies**	**Learning Outcomes**						**Total Effect (1-5)**
		LO1	**LO2**	**LO3**	**LO4**	**LO5**	**LO6**	
1	Recognize and distinguish the basic concepts such as data, information, and knowledge in the field of Management Information Systems and know the processes to be followed for data acquisition, storage, updating, and security.	x			x	x		**5**
2	Develop and manage databases suitable for collecting, storing, and updating data.			x	x			**4**
3	As a result of his/her ability to think algorithmically, and easily find solutions to problems concerning basic business functions.		x	x		x	x	**5**
4	Learn programming logic, and have information about current programming languages.			x				**4**
5	Be able to use up-to-date programming languages.		x	x		x		**5**
6	Be able to take part in teamwork or lead a team using knowledge of project management processes.	x			x		x	**5**
7	Know ethical and legal rules, and use professional field knowledge within the scope of ethical and legal rules.							
8	Know the fundamental areas of business administration namely management and organization, production, finance, marketing, numerical methods, accounting, etc., and have the knowledge and skills to work in-depth in at least one of them.							
9	Be able to solve the problems encountered in the field of internet programming by designing web applications.			x		x	x	**5**
10	Develop and manage logistics and supply chain management activities					x	x	**5**
11	Adapt his/her theoretical knowledge and the experience he/she will gain through practice at the departments of businesses such as information technologies, R&D, and management to real life.					x		**5**
12	Be able to develop strategies that will							

	provide a competitive advantage with his/her advanced knowledge of management strategies and management functions.							
13	Develop a business idea, commercialize the business idea, and design and manage his/her venture using entrepreneurial knowledge.							
14	By using English effectively, they can follow, read, write, speak and communicate universal information in the field of management information systems in a foreign language with professional competence.							
Total Effect								**43**

Policies and Procedures

Web page: https://www.ostimteknik.edu.tr/management-information-systems-english-1241/915

Exams: The exams aim at assessing various dimensions of learning: knowledge of concepts and theories and the ability to apply this knowledge to real-world phenomena, through analyzing the situation, distinguishing problems, and suggesting solutions. The written exams can be of two types, ie. open-ended questions, which can also be in the form of problems or multiple-choice questions.

Assignments: Homework (Assignments) might be applicable. Scientific Research Ethics Rules are very important while preparing assignments. The students should be careful about citing any material used from outside sources and reference them appropriately.

Missed exams: Any student missing an exam needs to bring an official medical report to be able to take a make-up exam. The medical report must be from a state hospital.

Projects: Not applicable.

Attendance: Attendance requirements are announced at the beginning of the term. Students are usually expected to attend at least 70% of the classes during each term.

Objections: If the student observes a material error in his/her grade, he/she has the right to place an objection to the Faculty or the Department. The claim is examined and the student is notified about its outcome.