

### COURSE PROFILE

Course Name	Code	Semester	Term	Theory +PS+Lab. (hour/week)	Local Credits	ECTS
Introduction to Real Analysis	MATH 311	Fall	5	3+0+0	3	8

<b>Prerequisites</b>	None
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<b>Course Language</b>	English
<b>Course Type</b>	Elective
<b>Course Lecturer</b>	<ul style="list-style-type: none"> <li>• Assoc.Prof. <u>Banu</u> Uzun</li> </ul>
<b>Course Assistant</b>	--
<b>Course Objectives</b>	This course aims to explain the basic material in the classical theory of functions of a real variable and in measure and integration theory, as well as some of the elementary topics in topology.
<b>Course Learning Outcomes</b>	<p>The students who succeeded in this course;</p> <ul style="list-style-type: none"> <li>• will be able to understand the fundamentals of naive set theory.</li> <li>• will be able to learn the countable and uncountable sets.</li> <li>• will be able to understand the concept of open and closed sets, limit points and coverings.</li> <li>• will be able to learn the properties of measure and measurable sets.</li> <li>• will be able to work with Lebesgue integral and to read and write proofs mathematical statements on moderate level.</li> </ul>
<b>Course Content</b>	Algebra of sets, the axiom of choice, countable sets, relations and equivalences, and the maximal principle. Outer measure, measurable sets and Lebesgue measure, measurable functions. The Lebesgue integral and its properties.

### COURSE CONTENT

Week	Subjects	Related Preparation
1	Some facts from naive set theory. Algebra of sets. The axiom of choice.	Chapter 1
2	Countable sets. Partial orderings and the maximal principle.	Chapter 1
3	Systems of sets. Rings and semirings.	Chapter 2

4	Open and closed sets of real numbers. Borel algebras. Borel sets.	Chapter 2
5	Outer and inner measure of plane sets.	Chapter 3
6	Measurable sets. Theorems about measurable sets.	Chapter 3
7	MIDTERM EXAM	--
8	Measure on a semiring.	Chapter 3
9	Measurable functions. Theorems about measurable functions.	Chapter 3
10	The Riemann integral. Upper and lower Riemann sums.	Chapter 4
11	The Lebesgue integral of a bounded function over a set of finite measure.	Chapter 4
12	The general Lebesgue integral.	Chapter 4
13	Limit properties of Lebesgue integral.	Chapter 4
14	Lebesgue integral of unbounded functions.	Chapter 4

<b>Course Textbooks</b>	H.L. Royden, Real Analysis, Prentice-Hall, 1988.
<b>Recommended References</b>	<ol style="list-style-type: none"> <li>1. A.N. Kolmogorov, S.V. Fomin, Introductory to Real Analysis, Dover Publications, 1975.</li> <li>2. A.E. Taylor, General Theory of Functions and Integration, Dover Publications, 2010.</li> </ol>

<b>Semester Requirements</b>	<b>Number</b>	<b>Percentage of Grade</b>
Attendance/Participation	-	-
Laboratory	-	-
Application	-	-
Special Course Internship (Work Placement)	-	-
Quizzes/Studio Critics	3	30
Homework Assignments	7	-
Presentation	-	-

Project	-	-
Seminar/Workshop	-	-
Midterms/Oral Exams	1	35
Final/Resit Exam	1	35
<b>Total</b>	12	100

<b>PERCENTAGE OF SEMESTER WORK</b>	11	65
<b>PERCENTAGE OF FINAL WORK</b>	1	35
<b>Total</b>	12	100

<b>Course Category</b>	Core Courses	X
	Major Area Courses	
	Supportive Courses	
	Media and Management Skills Courses	
	Transferable Skill Courses	

#### COURSE'S CONTRIBUTION TO PROGRAM

#	Program Qualifications / Outcomes	* Level of Contribution				
		1	2	3	4	5
1	To have a grasp of basic mathematics, applied mathematics and theories and applications of statistics.					X
2	To be able to use theoretical and applied knowledge acquired in the advanced fields of mathematics and statistics,					X
3	To be able to define and analyze problems and to find solutions based on scientific methods,					X
4	To be able to apply mathematics and statistics in real life with interdisciplinary approach and to discover their potentials,				X	
5	To be able to acquire necessary information and to make modeling in any field that mathematics is used and to improve herself/himself,			X		
6	To be able to criticize and renew her/his own models and solutions,			X		
7	To be able to tell theoretical and technical information easily to both experts in detail and					X

	nonexperts in basic and comprehensible way,					
<b>8</b>	To be able to use international resources in English and in a second foreign language from the European Language Portfolio (at the level of B1) effectively and to keep knowledge up-to-date, to communicate comfortably with colleagues from Turkey and other countries, to follow periodic literature,				X	
<b>9</b>	To be familiar with computer programs used in the fields of mathematics and statistics and to be able to use at least one of them effectively at the European Computer Driving Licence Advanced Level,	X				
<b>10</b>	To be able to behave in accordance with social, scientific and ethical values in each step of the projects involved and to be able to introduce and apply projects in terms of civic engagement,			X		
<b>11</b>	To be able to evaluate all processes effectively and to have enough awareness about quality management by being conscious and having intellectual background in the universal sense,			X		
<b>12</b>	By having a way of abstract thinking, to be able to connect concrete events and to transfer solutions, to be able to design experiments, collect data, and analyze results by scientific methods and to interfere,					X
<b>13</b>	To be able to continue lifelong learning by renewing the knowledge, the abilities and the competencies which have been developed during the program, and being conscious about lifelong learning,			X		
<b>14</b>	To be able to adapt and transfer the knowledge gained in the areas of mathematics and statistics to the level of secondary school,			X		
<b>15</b>	To be able to conduct a research either as an individual or as a team member, and to be effective in each related step of the project, to take role in the decision process, to plan and manage the project by using time effectively.					

\*1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

#### ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Number	Duration (Hours)	Total Workload
<b>Course Hours (Including Exams)</b>	14	3	53
<b>Tutorials</b>	-	-	-
<b>Laboratory</b>	-	-	-
<b>Application</b>	-	-	-

<b>Special Course Internship (Work Placement)</b>	-	-	-
<b>Field Work</b>	-	-	-
<b>Study Hours Out of Class</b>	14	3	42
<b>Presentations / Seminar</b>	-	-	-
<b>Project</b>	-	-	-
<b>Preparatory reading</b>	14	3	42
<b>Homework Assignments</b>	7	4	28
<b>Quizzes</b>	3	4	12
<b>Midterm Exams</b>	1	8	8
<b>Final / Resit Exam</b>	1	15	15
		<b>Total Workload</b>	<b>200</b>

#### COURSE CATEGORY

<b>ISCED GENERAL AREA CODES</b>	<b>GENERAL AREAS</b>	<b>ISCED BASIC AREA CODES</b>	<b>BASIC EDUCATIONAL AREAS</b>	
1	Education	14	Teacher Training and Educational Sciences	0
2	Humanities and Art	21	Art	0
2	Humanities and Art	22	Humanities	0
3	Social Sciences, Management and Law	31	Social and Behavioral Sciences	0
3	Social Sciences, Management and Law	32	Journalism and Informatics	0
3	Social Sciences, Management and Law	38	Law	0
4	Science	42	Life Sciences	0
4	Science	44	Natural Sciences	0
4	Science	46	Mathematics and Statistics	100
4	Science	48	Computer	0
5	Engineering, Manufacturing and Civil	52	Engineering	0

5	Engineering, Manufacturing and Civil	54	Manufacturing and Processing	0
5	Engineering, Manufacturing and Civil	58	Architecture and Structure	0
6	Agriculture	62	Agriculture, Forestry, Livestock, Fishery	0
6	Agriculture	64	Veterinary	0
7	Medicine and Welfare	72	Medical	0
7	Medicine and Welfare	76	Social Services	0
8	Service	81	Personal Services	0
8	Service	84	Transport Services	0
8	Service	85	Environment Protection	0
8	Service	86	Security Services	0