



ÇANKAYA UNIVERSITY

Faculty of Arts and Sciences

Course Definition Form

This form should be used for either an elective or a compulsory course being proposed and for a curriculum development process for an undergraduate curriculum at Çankaya University, Faculty of Arts and Sciences. Please fill in the form completely and submit the print-out carrying the approval of the Department Chair to the Dean's Office and mail its electronic copy to akguc@cankaya.edu.tr. Upon receipt of *both copies*, the print-out will be forwarded to the Faculty Academic Board for approval. Incomplete forms will be returned to the Department. The approved form is finally sent to the President's office for approval by the Senate.

Part I. Basic Course Information

Department Name	MATHEMATICS	Dept. Numeric Code	2 7
Course Code	M A T H 2 5 1	Number of Weekly Lecture Hours	4
		Number of Weekly Lab/Tutorial Hours	0
		Number of Credit Hours	4
Course Web Site	http://math251.cankaya.edu.tr		ECTS Credit
			0 7

Course Name

This information will appear in the printed catalogs and on the web online catalog.

English Name

Advanced Calculus I

Turkish Name

İleri Analiz I

Course Description

Provide a brief overview of what is covered during the semester. This information will appear in the printed catalogs and on the web online catalog. Maximum 60 words.

The Real line and Euclidean space, The topology of Euclidean space, Compact and Connected sets (compactness, the Heine-Borel theorem, Nested set property, Path-connected sets, connected sets), Continuous Mappings, Uniform, pointwise convergences, the Weierstrass M-test, Integration and differentiation of series, the space of continuous functions, the Arzela - Ascoli theorem.

Prerequisites (if any) <i>Give course codes and check all that are applicable.</i>	1 st	2 nd	3 rd	4 th
	M A T H 1 5 4			
	<input type="checkbox"/> Consent of the Instructor		<input type="checkbox"/> Senior Standing	
	<input type="checkbox"/> Give others, if any.			
Co-requisites (if any)	1 st	2 nd	3 rd	4 th
Course Type <i>Check all that are applicable</i>	<input checked="" type="checkbox"/> Must course for dept. <input type="checkbox"/> Must course for other dept.(s) <input type="checkbox"/> Elective course for dept. <input type="checkbox"/> Elective course for other dept.(s)			

Course Classification

Give the appropriate percentage for each category.

Category	Mathematics & Natural Sciences	Engineering & Architectural Sciences		
Percentage	80	20		

Part II. Detailed Course Information

Course Objectives*Maximum 100 words.*

To teach basic topology of Euclidean space and give the ideas of continuity and uniform continuity, convergence and uniform convergence, and to teach the differences and applications of these concepts.

Learning Outcomes*Explain the learning outcomes of the course. Maximum 10 items.*

- 1) The students will understand the basics of the topology of the Euclidean space (open, closed sets, compactness, completeness, boundary, closure etc.)
- 2) The students will understand the notions; uniform continuity of a function and uniform convergence of a sequence of functions
- 3) The students will establish the difference between these concepts

Textbook(s)*List the textbook(s), if any, and other related main course material.*

Author(s)	Title	Publisher	Publication Year	ISBN
J.Marsden and DM. J. Hoffman	<i>Elementary Classical Analysis</i>	W.H.Freeman and Company	1995	978-0-7167-2105-5

Reference Books*List, if any, other reference books to be used as supplementary material.*

Author(s)	Title	Publisher	Publication Year	ISBN
Buck, C and Buck, R.C.	Advanced Calculus	Waveland Press	2003	1577663020

Teaching Policy*Explain how you will organize the course (lectures, laboratories, tutorials, studio work, seminars, etc.)*

4 hours of lecturing per week. Attendance to the lectures is compulsory.

Laboratory/Studio Work*Give the number of laboratory/studio hours required per week, if any, to do supervised laboratory/studio work and list the names of the laboratories/studios in which these sessions will be conducted.*

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Computer Usage*Briefly describe the computer usage and the hardware/software requirements for the course.*

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Course Outline	
<i>List the weekly topics to be covered.</i>	
Week	Topic(s)
1	The Real line and Euclidean space (ordered field, distance, Schwarz Inequality)
2	The topology of Euclidean space; open sets, Interior of a set, closed sets,
3	The topology of Euclidean space; accumulation points, closure of a set, boundary of a set, sequences, completeness
4	Compact and Connected sets; compactness, the Heine-Borel theorem,
5	Compact and Connected sets; Nested set property, Path-connected sets, Connected sets
6	Continuous Mappings; continuity, Images of compact and connected sets
7	Continuous Mappings; operations on continuous mappings, the Boundedness of continuous functions on compact sets
8	Continuous Mappings; Uniform continuity
9	Uniform convergence
10	Pointwise convergence, the Weierstrass M-test Uniform convergence
11	Integration and differentiation of series Uniform convergence;
12	Line Integrals, Flux, Path independence
13	Fundamental theorem of line integrals
14	Green's theorem (Flux divergence and Circulation-Curl)

Grading Policy								
<i>List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.</i>								
Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage	Assessment Tool	Quantity	Percentage
Homework			Case Study			Attendance		
Quiz(es)	5	10	Lab Work			Field Study		
Midterm Exam	2	50	Classroom Participation			Project		
Term Paper			Oral Presentation			Final Exam	1	40

ECTS Workload			
<i>List all the activities considered under the ECTS.</i>			
Activity	Quantity	Duration (hours)	Total Workload (hours)
Attending Lectures (<i>weekly basis</i>)	14	4	56
Attending Labs/Recitations (<i>weekly basis</i>)			
Compilation and finalization of course/lecture notes (<i>weekly basis</i>)	14	1	14
Collection and selection of relevant material (<i>once</i>)	1	16	16
Self study of relevant material (<i>weekly basis</i>)	14	1	14
Take-home assignments			
Preparation for quizzes	5	2	10
Preparation for mid-term exams (<i>including the duration of the exams</i>)	2	21	42
Preparation of term paper/case-study report (<i>including oral presentation</i>)			
Preparation of term project/field study report (<i>including oral presentation</i>)			
Preparation for final exam (<i>including the duration of the exam</i>)	1	23	23
TOTAL WORKLOAD / 25			175/25
ECTS Credit			7

Total Workloads are calculated automatically by formulas. To update all the formulas in the document first press CTRL+A and then press F9.

Program Qualifications vs. Learning Outcomes Consider the program qualifications given below as determined in terms of learning outcomes and acquisition of capabilities for all the courses in the curriculum. Look at the learning outcomes of this course given above. Relate these two using the Likert Scale by marking with X in one of the five choices at the right.

No	Program Qualifications	Contribution				
		0	1	2	3	4
1	Adequate knowledge in mathematics; ability to use applied and theoretical information in these areas to solve pure and applied mathematics problems.					X
2	Ability to use modern computational tools to analyze an abstract or real life problem			X		
3	Adequate knowledge in theoretical and historical background in mathematics				X	
4	Ability to work individually and in teams efficiently, ability to collaborate effectively in teams to analyze complex systems from intra-disciplinary and multi-disciplinary areas				X	
5	Ability to communicate effectively in English about technical subjects, both orally and in writing				X	
6	Ability to use, develop and implement new experiments and algorithms to solve scientific, engineering and financial problems				X	
7	Ability to analyze a mathematical problem using both analytical and numerical methods; use and compare theoretical and simulational methods to gain deeper insight				X	
8	Ability to report the findings, conclusions and interpretations related to a project in the area of pure and applied mathematics, ability to write technical reports, to prepare and conduct effective presentations				X	
9	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to keep continuous self improvement				X	
10	Awareness of professional and ethical responsibility issues and their legal consequences					X

Scale for contribution to a qualification: 0-none, 1-little, 2-moderate, 3-considerable, 4-highest

Part III New Course Proposal Information

State only if it is a new course

Is the new course replacing a former course in the curriculum?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Former Course's Code <table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>									Former Course's Name <table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>								
Is there any similar course which has content overlap with other courses offered by the university?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Most Similar Course's Code <table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>									Most Similar Course's Name <table border="1"><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>								
Frequency of Offerings <i>Check all semesters in which the course is to be offered.</i>		<input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Summer																			
First Offering	Academic Year	<table border="1"><tr><td>2</td><td>0</td><td>1</td><td>9</td><td>/</td><td>2</td><td>0</td><td>2</td><td>0</td></tr></table>			2	0	1	9	/	2	0	2	0	Semester	<input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring						
2	0	1	9	/	2	0	2	0													
Maximum Class Size Proposed	<table border="1"><tr><td>30</td></tr></table>	30	Student Quota for Other Departments	<table border="1"><tr><td>0</td></tr></table>	0	Approximate Number of Students Expected to Take the Course	<table border="1"><tr><td>15</td></tr></table>	15													
30																					
0																					
15																					
Justification for the proposal <i>Maximum 80 words</i>																					
This is a fundamental course in any mathematics department. It gives the basics of understanding, comprehending and proving mathematical arguments.																					

Part IV Approval

Proposed by	Faculty Member <i>Give the Academic Title first.</i>	Signature	Date
	Assoc. Prof. Dr. Ekin UĞURLU		

Departmental Board sitting date		Sitting number		Motion number	
Department Chair	Prof. Dr. Fahd JARAD	Signature		Date	

Faculty Academic Board sitting date		Sitting number		Motion number	
Dean	Prof. Dr. Buket AKKOYUNLU	Signature		Date	

Senate sitting date		Sitting number		Motion number	
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