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**	27
Course Code	MATH252	**Number of Weekly Lecture Hours**	4	**Number of Weekly Lab/Tutorial Hours**	0	**Number of Credit Hours**	4
Course Web Site	http://math252.cankaya.edu.tr					**ECTS Credit**	08

Course Name *This information will appear in the printed catalogs and on the web online catalog.*	
English Name	Advanced Calculus II
Turkish Name	İleri Analiz II

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.

Continuous functions, the Arzela - Ascoli theorem, the contraction mapping, the Stone-Weierstrass theorem, Differentiable Mappings, Differentials of transformations, Matrix representation, Differentiable paths,The chain rule, Product rule and gradients, Higher derivatives, Maxima and Minima of the functions defined on R^n, The Inverse and Implicit Function Theorems, Lagrange Multipliers, Integration, Sets of measure zero, Improper Integrals, Fubini's Theorem, Fourier Analysis, Inner Product Spaces, Orthogonal Families of Functions, Fourier Series.

Prerequisites (if any) *Give course codes and check all that are applicable.*	1st: MATH154	2nd: MATH251	3rd:	4th:
	☐ Consent of the Instructor	☐ Senior Standing	☐ Give others, if any.	
Co-requisites (if any)	1st:	2nd:	3rd:	4th:
Course Type *Check all that are applicable*	☒ Must course for dept.	☐ Must course for other dept.(s)	☐ Elective course for dept.	☐ 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 basics on the space of continuous functions, To learn Differentials of Transformations, To teach the Inverse and Implicit Function Theorems and their applications, To learn the concept of Integrability and measure zero, To teach basics of Fourier Analysis

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

1) The students will understand the basics of differentials of transformations
2) The students will understand the notions of Integrability and measure zero
3) The students will understand the basics of Fourier Analysis and Parsevals Theorem

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	*Elementary Classical Analysis*	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.

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

Course Outline
List the weekly topics to be covered.

Week	Topic(s)
1	The space of continuous functions, the Arzela - Ascoli theorem, the Stone-Weierstrass theorem
2	The contraction mapping principle and its applications
3	Differentiable Mappings, Differentials of transformations, Matrix representation
4	Continuity of differentiable mappings, Differentiable paths
5	Conditions for differentiability, The chain rule, Product rule and gradients, Higher derivatives
6	The Inverse and Implicit Function Theorems and Related Topics
7	Maxima and Minima of the functions defined on R^n
8	Constrained extrema and Lagrange Multipliers
9	Quadratic Forms, Generalized form of Hessian
10	Integration, Integrable functions, Volume and sets of measure zero
11	Improper Integrals, convergence theorems and their applications
12	Leibnitz's Formula, Gamma and Beta Functions Double and triple integrals, Fubini's Theorem and the change of variables formula
13	Fourier Analysis; Inner Product Spaces, Orthogonal Families of Functions
14	Convergence Properties of Fourier Series and Review

Grading Policy
List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.

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
List all the activities considered under the ECTS.

Activity	Quantity	Duration (hours)	Total Workload (hours)
Attending Lectures (*weekly basis*)	14	4	56
Attending Labs/Recitations (*weekly basis*)			
Compilation and finalization of course/lecture notes (*weekly basis*)	14	1	14
Collection and selection of relevant material (*once*)	1	11	11
Self study of relevant material (*weekly basis*)	14	2	28
Take-home assignments			
Preparation for quizzes	5	3	15
Preparation for mid-term exams (*including the duration of the exams*)	2	25	50
Preparation of term paper/case-study report (*including oral presentation*)			
Preparation of term project/field study report (*including oral presentation*)			
Preparation for final exam (*including the duration of the exam*)	1	26	26
		TOTAL WORKLOAD / 25	200/25
		ECTS Credit	**8**

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 mathematical 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 ☐	No ☒	Former Course's Code	Former Course's Name
Is there any similar course which has content **overlap** with other courses offered by the university**?**	Yes ☐	No ☒	Most Similar Course's Code	Most Similar Course's Name

Frequency of Offerings *Check all semesters in which the course is to be offered.*	☐ Fall	☒ Spring	☐ Summer				
First Offering	Academic Year	2019/2020		Semester	☐ Fall	☒ Spring	
Maximum **Class Size** Proposed	30	Student **Quota** for Other Departments	0	Approximate **Number of Students** Expected to Take the Course	15		

Justification for the proposal
Maximum 80 words

This is a fundamental course in any mathematics department. It gives the basics of understanding, comprehending and proving mathematical arguments.

Part IV Approval

	Faculty Member *Give the Academic Title first.*	Signature	Date
Proposed by	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	