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 serpilkilic@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 4 0 7	**Number of Weekly Lecture Hours** 3	**Number of Weekly Lab/Tutorial Hours** 0	**Number of Credit Hours** 3		
Course Web Site	http:// math.cankaya.edu.tr			ECTS Credit	0 5	

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

English Name	Lectures on Ordinary Differential Equations
Turkish Name	Adi Diferansiyel Denklemler üzerine Dersler

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.

Introducing differential inequalities, Gronwall's lemma, Picard's method on the existence and uniqueness of solutions, vector and matrix differential equations, nth-order differential equations and Wronskians of solutions, complex-valued differential equations, boundary-value and eigenvalue problems, oscillation theory, Liouville transform

Prerequisites (if any) *Give course codes and check all that are applicable.*	1st M A T H 2 4 3	2nd M A T H 2 3 3	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	70	30			

Part II. Detailed Course Information

Course Objectives	2/4
Maximum 100 words.	

This course aims to introduce theoretical part of differential equations and differential inequalities. In particular, the method of proving existence and uniqueness theorem on the solutions of scalar and matrix differential equations will be given, some eigenvalue problems will be introduced and some boundary value problems will be shared. Moreover, the concept of Wronskian will be given that enables one to make sure about linearly independence of the set of solutions of differential equations. Finally, Liouville transform and oscillation theory will be given.

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

After completing the lectures, the students will be able to handle some boundary value and eigenvalue problems. Moreover, they will know how to pass from scalar differential equation into matrix differential equations. They will also learn how to get some information on the zeros of differential equations using some information from an auxiliary equation. Finally, they will learn how to change the shape of the given scalar equations using Liouville transforms.

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

Author(s)	Title	Publisher	Publication Year	ISBN
Albert K. Erkip	Introduction to Theoretical Aspects of Ordinary Differential equations	METU Library	1992	
Witold Hurewicz	Lectures on Ordinary Differential Equations	The MIT Press	1958	0262 58001 2

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

Author(s)	Title	Publisher	Publication Year	ISBN
Earl A. Coddington, Norman Levinson	Theory of Ordinary Differential Equations	McGraw-Hill Book Company	1955	0898747554
Einar Hille	Lectures on Ordinary Differential Equations	Addison-Wesley Publishing Company	1968	020153083X

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

Attendance at 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	Introduction
2	Differential inequalities, Gronwall's lemma
3	Existence of solutions (Picard's method)
4	Continuation of solutions
5	Vector differential equations
6	Matrix differential equation
7	Complex-valued system of differential equations
8	Arbitrary order differential equations
9	Corresponding differential operators
10	Wronskian of solutions of differential equations
11	Boundary value problems
12	Eigenvalue problems
13	Zeros of solutions of differential equations, Sturm comparison theorem
14	The Liouville transform

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	2	20	Case Study			Attendance		
Quiz(es)			Lab Work			Field Study		
Midterm Exam	2	40	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	3	42
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*)	10	1	10
Take-home assignments	2	1	2
Preparation for quizzes			
Preparation for mid-term exams (*including the duration of the exams*)	2	10	20
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			125/25
ECTS Credit			**5**

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

No	Program Qualifications	Contribution				
	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.*					
	Program Qualifications	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