

<b>Department</b> Department of Mathematics			<b>Academic Year</b> 2022-2023	<b>Date</b> 01/12/2022	
<b>Course Unit Code</b> MATH3114	<b>Course Unit Title</b> Fractional Differential Equations		<b>Semester/Year</b> Spring / 3	<b>Number of ECTS Credits</b> 5	
<b>Language of Instruction</b>	Turkish				
<b>Type of Course Unit</b>	Elective				
<b>Prerequisites and co-requisites</b>	-				
<b>Address of course</b>	-				
<b>Local Credit</b>	<b>Theoretical</b>	<b>Practical</b>	<b>Laboratory</b>	<b>Presentation</b>	<b>Project</b>
3	2	2	-	-	-
<b>Name of Lecturers</b>	Professor Erdal BAŞ				
<b>Assistants</b>	-				

<b>Course content</b>	The emergence of Fractional Analysis. Some Special Functions. Riemann-Liouville Fractional Integrals and Derivatives. Grünwald-Letnikov Fractional Derivatives and Properties. Caputo Fractional Derivatives and Properties. Comparison of Fractional Derivative Approaches. Laplace Transformations of Fractional Derivatives. Fractional Differential Equations
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<b>Weekly Detailed Course Contents</b>	
<b>Week</b>	<b>Topic</b>
1	Introduction to fractional analysis and its history
2	Special functions of fractional analysis
3	Mittag Leffler functions
4	Riemann-Liouville fractional integrals and derivatives
5	Grünwald-Letnikov fractional derivatives and properties
6	Caputo fractional derivatives and properties
7	Applications of Caputo fractional derivatives
8	Comparison of fractional derivative approaches
9	General application
10	Laplace transformations of fractional derivatives
11	Laplace transformations of fractional derivatives
12	Basic fractional differential equations
13	Basic fractional differential equations
14	A brief evaluation of the course content and topics

<b>Course Resources</b>	1. K. S. Miller, B. Ross, An Introduction to the Fractional Calculus and Fractional Differential Equations, John Wiley & Sons, Inc., 1993. 2. I. Podlubny, Fractional Differential Equations, Academic Press, 1999. 3. K. B. Oldham and J. Spanier, The Fractional Calculus, Academic Press, 1974.
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<b>Assessment Methods and Criteria</b>	<b>In-Term studies</b>	<b>Quantity</b>	<b>Percentage (%)</b>
	<b>Mid-Term Exams</b>	1	40
	<b>Quizzes</b>	-	-
	<b>Assignments</b>	-	-
	<b>Projects</b>	-	-
	<b>Term assignment</b>	-	-
	<b>Laboratory</b>	-	-
	<b>Other</b>	-	-
	<b>Final exam</b>	1	60

<b>On Assessment Methods and Criteria</b>	A grade of success; is determined by using the relative evaluation system or the discretion of the instructor. In order to be able to evaluate the courses in which the relative evaluation system and the teaching staff member's discretion are applied, the final exam score of the student must be at least YSAS. Students who fall below this score are considered to fail directly. For the courses that can not be evaluated with the relative evaluation system, the distribution of the final grade of the final grade and the letter grades which are the equivalents of the success grades are determined by the consent of the instructor who gives the lesson using the table prepared by the Senate with 100 points. A student who has received a grade AA, BA, BB, CB or CC grade is deemed to have completed that course. A student who has received one of the grade DC or DD grades is deemed to have fulfilled that course condition. In order for a student who takes DD and DC letters to be counted as successful, the GNO must be at least 2.00. A student who receives a graded FF grade is considered to have failed that course.
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<b>Percentage of Course Category (%)</b>	<b>Mathematics and Basic Sciences</b>	100
	<b>Computer Sciences</b>	0
	<b>Programming Design</b>	0
	<b>Social sciences</b>	0

<b>Course Outcome</b>	Students will gain a general knowledge about the existence and application of the concept of fractional derivative and integral
<b>Aims of the course</b>	The aim of the course is to give a basic idea about fractional differential equations. It is also the basis for fractional differential equations.
<b>The way of processing course</b>	Face to face

<b>Relation of the course with program outcomes</b>				
Learning outcomes		1	2	3
<b>1</b>	To have advanced theoretical and applied knowledge in a way to prioritize the scientific approach supported by textbooks containing up-to-date information in the field, application tools and other resources		X	
<b>2</b>	Adapting and transferring the knowledge gained in the field to secondary education			
<b>3</b>	Ability to independently carry out an advanced study in the field			
<b>4</b>	Be aware of the necessity of lifelong learning and continuously improve their professional knowledge and skills.			
<b>5</b>	Using a foreign language at least at the European Language Portfolio B1 General Level, following the information in the field and being able to communicate with colleagues			
<b>6</b>	To be able to use information and communication technologies together with computer software at minimum advanced level of European computer license required by the field.			
<b>7</b>	Have the ability to make oral and written presentation in native language			
<b>8</b>	Having the ability to understand spoken English and use English at reading level			
<b>9</b>	To have the ability to assimilate mathematical concepts and understand the relationships between them, to recognize different aspects of the same concepts and relationships			
<b>10</b>	To have the ability to define and formulate the relationships between items in non-mathematical disciplines in the language of mathematics.			X
<b>11</b>	To have the ability to use mathematical knowledge in different problems			X
<b>12</b>	Having the ability to develop computer programs using mathematical knowledge			
<b>Contribution of the course: 1:No 2:Partially 3:Completely</b>				

**Preparer:** Professor Erdal BAŞ  
**Preparation date:** 01/12/2022