	Course name: MATH 422 Applied Mathematics II	**Department:** Mathematics	Semester
			8
	Methods of Education		Credit (ECTS)

	Lecture	Recitation/ (Etud)	Lab	Exams	Homework / Quiz	Other	Total	
	42	0	0	42	40	56	180	**6**

Language	English
Compulsory/Elective	Departmental Elective
Prerequisites	MATH421

	Weeks	**Subjects**
	1	Sturm-Liouville systems, Eigenvalue problems
	2	Eigenfunctions and their expansions
	3	Orthogonal function spaces
	4	Adjoint forms and Lagrange identity
	5	Gauss differential equation, Hypergeometric functions
	6	Singular Sturm-Livouille systems, Oscillating solutions on a half axis
	7	Sturm's separation and comparison theorems.
Course Contents	8	Bessel differential equations.
	9	Bessel functions and Bessel series.
	10	Neumann functions, Hankel functions and modified Bessel functions.
	11	Legendre differential equations and Legendre polynomials
	12	Rodrigues formula, generating function, orthogonality property
	13	Norm of Legendre polynomials, some important orthogonal polynomials and Legendre series
	14	Norm of Legendre polynomials, some important orthogonal polynomials and Legendre series

Course Objectives	This course deals with some special functions and special differential forms which are frequently used in Mathematics, Physics and Engineering and provides their solutions.

Learning Outcomes and Competences	By the end of this course, a student will be able to:

1. express adjoint forms and Lagrange identity
2. tell about Sturm-Liouville systems and obtain eigenvalues and eigenfunctions of integral equations
3. give Sturm's separation and comparison theorems
4. solve Bessel differential equations and gives information about orthogonality properties, norms of Bessel functions and Bessel series
5. examine Rodrigues formula , generating functions, orthogonality and norm of Legendre polynomials
6. give information about orthogonality and norm of Legendre polynomials and Legendre series
7. solve the Gaussian differential equations

Textbook and /or References	

1. 2012, Peter V. O'Neil, Advanced Engineering Mathematics, Cengage Learning, USA. 7th Edition, Part 4, Chapters 13-15
2. 2018, James P. Keener, Principles of applied mathematics: Transformation an Approximation , CRC Press, Taylor&Francis Group, Boca Raton, FL.
3. 2015, Russell L.Herman, Introduction to Partial Differential Equations

Assessment Methods and Criteria	In-Term Studies	Quantity	Percentage%
	Mid-terms	1	30
	Quizes	0	0
	Assignments	4	20
	Attendance	0	0
	Practice	0	0
	Project	0	0
	Final Examination	1	50
	Total	**6**	**100**

ECTS Allocated Based on Student Workload	Activities	Quantity	Duration	Total Work Load
	Course Duration	14	3	42
	Hours for off-the-c.r.study	14	4	56
	Assignments	4	10	40
	Mid-terms	1	14	14
	Project	0	0	0
	Final Examination	1	28	28
	Total	**34**	**59**	**180**

Instructors	