QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Department of Mathematics

Study plan No.	**2021/2022**			**University Specialization**		**Master in Mathematics**	
Course No.	**0101741**			**Course name**		**Applied mathematics (1)**	
Credit Hours	**3**			**Prerequisite/ Co-requisite**			
Course type	☐ MANDATORY UNIVERSITY REQUIREMENT	☐ UNIVERSITY ELECTIVE REQUIREMENTS	☐ FACULTY MANDATORY REQUIREMENT	☐ Support course family requirements	✓ **Mandatory requirements**	☐ Elective requirements	
Teaching style	☐ Full online learning		✓ **Blended learning**		☐ Traditional learning		
Teaching model	☐ 1 Synchronous: 1 asynchronous		✓ **2 face to face : 1 asynchronous**		☐ 2 Traditional		

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	**Time**	**Place**	**Number of students**	**Teaching style**	**Approved model**
				Blended	

Brief description

Review of ODEs, existence and uniqueness of solutions for ODEs, Integral Transforms, and Green's Function, Approximation Methods, non-linear ODEs and their stability

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	1. Elementary differential equations and boundary value problem, Boyce W.E.-DiPrima R.C. 2. Introduction to ordinary differential equations, Rabenstein A.			
Supportive learning resources (Books, databases, periodicals, software, applications, others)	1. Applied Mathematics, Logan D. 2. Fundamentals of Differential Equations, Nagle R.			
Supporting websites	1. http://ocw.mit.edu/courses/mathematics/ 2. https://www.youtube.com/watch?v=SHS4zsNu8y8 3. https://www.youtube.com/watch?v=7q33RFkMMpY 4. https://www.youtube.com/watch?v=vKTVmBMekPk			
The physical environment for teaching	✓ Class room	☐ labs	✓ Virtual educational platform	☐ Others
Necessary equipment and software				
Supporting people with special needs				
For technical support				

Course learning outcomes (S= *Skills, C= Competences K= Knowledge,)*

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No.	Course learning outcomes	The associated program learning output code
	Knowledge	
K1	Define the basic concepts of ordinary differential equations.	MK1
K2	Recognize proper procedure to solve a given ordinary differential equations.	MK2
	Skills	
S1	Examine the stability of the nonlinear system. Find, if possible, the Green's function	MS1
	Competences	
C1	Be involved in the process of illustrating concepts and exploring facts.	

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm exam	30%	**30%**	40%	30%
Participation / practical applications	0	**0**	10%	30%
Asynchronous interactive activities	30%	**30%**	0	0
Final exam	40%	**40%**	50%	40%

Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject	learning style	Reference
1	Review of ODEs.	Lecture	Ref 1
2	The existence and uniqueness theorem.	Lecture	65 , 106-113 , 138 277-287 , 343 Ref 1
3	Further properties of linear differential equations. Reduction of order.	Lecture	165 - 168
4	Factorization of operators. Some variable changes	Lecture	49-66
5	Perturbation methods.	Lecture	67-81
6	The regular perturbation method. The Poincare-Lindstedt method.	Lecture	82-90
7	The singular perturbation method	Lecture	91-110
8	Boundary value problems and Green's function. **Midterm Exam 30%**	Lecture	75 – 78 79 – 82
9	Systems of first order ODEs.	Lecture	125 – 137
10	Linear systems with constant coefficients.	Lecture	119-124
11	Phase plane . Linear systems.	Lecture	589 – 593
12	Phase plane :Linear systems.	Lecture	602 – 615 250
13	Stability of linear system	Lecture	251-258
14	Almost linear system with applications	Lecture	268 – 273

15	Liapunov's second method	Lecture	296 – 299
16	**Final Exam 40%**		

Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)

Week	Task / activity	Reference	Expected results
1	Background	Ordinary Differential Equations	Self-reading and Discussion
2	Video 1 Solving exercises	E-learning	Discussion in the class
3	Home work1:	(Lecture notes and Ref.1)	Submit a pdf or word sheet
4	Quiz 1	On the subjects studied on the first three weeks	Submitting on the E-learning
5	Assignment 1:	Internet sources and the other Supportive learning resources	Presentation
6	Video 2	Solving exercises	Discussion in the class
7	Home work	(Lecture notes and Ref.1)	Submit a pdf or word sheet
8	Assignment 2:	Internet sources and the other Supportive learning resources	Submitted with the mid exam
9	Self-reading	Systems of Linear Equations	Talk
10	Video3	E-learning	Discussion in the class
11	Home work 3:	(Lecture notes and Ref.1)	Submit a pdf or word sheet
12	Self-reading	Laplace Transform	Talk
13	Quiz 2	On the subjects studied on the subject studied after midexam	Submitting on the E-learning
14	Presentation of the subject:	Internet sources and the reference book	Video
15	Video 4 Revision of all the course	E-learning	
16	Final Exam	-	