Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Chaos I	FZK463.2	7. Semester	3 + 0	3.0	7.0

Prerequisites	None

Language of Instruction	Turkish
Course Level	Bacheclor's Degree (First Cycle)
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Prof. Dr. İsmail TARHAN
Instructors	
Assistants	
Course Objectives	The aim of this course is to discuss first degree differential equation systems, fixed points classification, a circle of fluid flow, phase portraits, limited rotations, Poincare-Bendixson theorem, closed orbits and periodic motion, linear systems, Hopf replication forks and spontaneous symmetry breakages, forced oscillations extremism, coupled oscillations and quasi of-periodic, Lorentz equations, powerful shot chaos, one-dimensional maps, Liapunov are under, generality; group renormalizasyonu of equality, self-similarity and fractals.
Course Content	Topics to be covered in this course include are basic concepts of chaos and application examples, differential equation systems, linear systems, the concept of symmetry and spontaneous symmetry breakages, oscillating systems, extremism of oscillations, swing, and quasi-periodic oscillations of double, Lorentz equations, fundamental interactions chaos approaches, 1-dimensional haritalamalar and properties, normalization concepts and methods, self-similarity, fractals and some application examples, fractals and some application examples.
Course Learning Outcomes	1) interpret the basic concepts of chaos theory 2) Analyze problems of chaos 3) Explain fundamental concepts of chaos 4) Apply the concepts of chaos in various events

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Basic concepts of chaos and application examples.	Oral lectures with interactive discussions, researches and homeworks.	

Quick Access

Physics
- Qualification Awarded
- Level of Qualification
- Qualification Requirements and Regulations
- Specific Admission Requirements
- Recognition of Prior Learning
- Profile of the Program
- Program Key Learning Outcomes
- Occupational Profile of Graduates
- Access to Further Studies
- Course Structure & Credits
- Exam Regulations & Assessment & Grading
- Graduation Requirements
- Mode of Study
- Programme Director(or Equivalent)
- Evaluation Questionnaire
- TYYÇ

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- Course Information
- Weekly Course Content
- Resources
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

2. Week	Differential Equation Systems.	Oral lectures with interactive discussions, researches and homeworks.	
3. Week	Linear Systems	Oral lectures with interactive discussions, researches and homeworks.	
4. Week	The concept of symmetry and spontaneous symmetry breakages.	Oral lectures with interactive discussions, researches and homeworks.	
5. Week	Oscillating systems	Oral lectures with interactive discussions, researches and homeworks.	
6. Week	Extremism of oscillations	Oral lectures with interactive discussions, researches and homeworks.	
7. Week	Swing, and quasi-periodic oscillations of double	Oral lectures with interactive discussions, researches and homeworks.	
8. Week	Mid-term Exam	Written Exam	
9. Week	Fundamental interactions chaos approaches.	Oral lectures with interactive discussions, researches and homeworks.	
10. Week	Lorentz equations	Oral lectures with interactive discussions, researches and homeworks.	
11. Week	1-dimensional haritalamalar and properties	Oral lectures with interactive discussions, researches and homeworks.	
12. Week	Normalization concepts and methods.	Oral lectures with interactive discussions, researches and homeworks.	
13. Week	Self similarity.	Oral lectures with interactive discussions, researches and homeworks.	
14. Week	Fractals and some application examples.	Oral lectures with interactive discussions, researches and homeworks.	
15. Week	Fractals and some application examples.	Oral lectures with interactive discussions, researches and homeworks.	
16. Week	Final Exam	Written Exam	

RESOURCES

Recommended Sources
Introductory differential equations : from linearity to chaos / Eric John Kostelich, Eric J. Kostelich, Dieter Armbruster.
Introduction to chaos : physics and mathematics of chaotic phenomena / Hiroyuki Nagashima, Hiroyuki Nagashima, Yoshikazu Baba; translated from Japanese by Mikio Nakahara.

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Mid-term exam + Assignment + Research & Project and Presentation 40%, Final Exam 60%

COURSE CATEGORY

Course Category	Percentage
Support Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4
PY1	4	5	4	4	3
PY2	5	4	4	4	3
PY3	4	5	4	3	3
PY4	3	4	4	4	4
PY5	4	5	5	4	4
PY6	4	4	4	3	3
PY7	4	3	4	4	4
PY8	2	2	3	3	4
PY9	4	4	4	3	4
PY10	4	4	4	3	3
PY11	5	4	5	4	4
PY12	3	3	3	3	4
PY13	4	4	4	3	3
PY14	4	4	4	4	4
PY15	4	4	3	4	3

*DK = Course's Contrubution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

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ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	15	15
Mid Term Exam Preparation	1	10	10
Case Study	10	3	30

Assignment 1	10	3	30
Application/Practice	8	2	16
Further Study	11	3	33
Final Exam	1	2	2
Mid Term Exam 1	1	2	2
		Total Workload	180
		Total Workload / 25.5 (s)	7.06
		ECTS Credit of the Course	7