Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Nuclear Reactor Theory	FZ5039		3 + 0	3.0	7.5

Prerequisites	None

Language of Instruction	Turkish
Course Level	Second Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assoc. Prof. Dr. Emine Dilara AYDIN
Instructors	Assoc. Prof. Dr. Emine Dilara AYDIN Assist. Prof. Dr. Ayşe KÜÇÜKARSLAN
Assistants	
Course Objectives	The purpose of the course is to provide an understanding of the basic physical principles on the operation of the nuclear reactors and to ensure that the students can track the improvements on the reactor technologies.
Course Content	Introduction, Basics of nuclear systems, Mathematical descriptions of physical events: Neutron Transport, Diffusion and Monte Carlo, Nuclear data and cross section procession, Slowing down of neutrons, Multi-group method, Perturbation Theory, Reactor Kinetics and Dynamics, Modern Reactor Analysis Methods and Codes, Principles of Nuclear Reactor Design Applications of Modeling Techniques Featured.
Course Learning Outcomes	1) After completion of this course students will be able to: understand the definitions of numerical methods and applications of nuclear engineering. 2) Calculate the analytical and numerical calculations of the nuclear system. 3) Process and develop criticality, the composition of core changes, including the dynamic and safety aspects of all three-dimensional calculations of the nuclear core and multi-group cross section library of data

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction.	Oral lecture Question-answer Homework	
2. Week	Basics of nuclear systems.	Oral lecture Question-answer Homework	

3. Week	Mathematical descriptions of physical events: Neutron Transport, Diffusion and Monte Carlo.	Oral lecture Question-answer Homework	
4. Week	Mathematical descriptions of physical events: Neutron Transport, Diffusion and Monte Carlo.	Oral lecture Question-answer Homework	
5. Week	Mathematical descriptions of physical events: Neutron Transport, Diffusion and Monte Carlo.	Oral lecture Question-answer Homework	
6. Week	Nuclear data and cross section procession.	Oral lecture Question-answer Homework	
7. Week	Slowing down of neutrons.	Oral lecture Question-answer Homework	
8. Week	Mid-term Exam		
9. Week	Multi-group method.	Oral lecture Question-answer Homework	
10. Week	Multi-group method.	Oral lecture Question-answer Homework	
11. Week	Perturbation Theory.	Oral lecture Question-answer Homework	
12. Week	Reactor Kinetics and Dynamics.	Oral lecture Question-answer Homework	
13. Week	Modern Reactor Analysis Methods and Codes.	Oral lecture Question-answer Homework	
14. Week	Principles of Nuclear Reactor Design Applications of Modeling Techniques Featured.	Oral lecture Question-answer Homework	
15. Week	Principles of Nuclear Reactor Design Applications of Modeling Techniques Featured.	Oral lecture Question-answer Homework	
16. Week	Final Exam		

RESOURCES

Recommended Sources
Stacey Weston M., Nuclear Reactor Physics, Wiley-Interscience; ISBN: 0471391271; 1. Edition, January 16, 2001.
Lamarsh John R., Introduction to Nuclear Reactor Theory , Amer Nuclear Society; ISBN: 0894480405; September 2002.
Bell George I. and Glasstone Samuel, Nuclear Reactor Theory, Krieger Publishing Company, 1985.
Duderstadt J. J. and Hamilton L. J., Nuclear Reactor Analysis, John Wiley & Sons, Inc., 1976.
Henry Allan F., Nuclear Reactor Analysis, MIT Press; ASIN: 0262080818; June 1975
Duderstadt J.J. and Martin W.R., Transport Theory, Wiley , New York,1979.
Zweifel P. F., Reactor Physics, McGraw-Hill; ASIN: 0070735972.

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Mid-term Exam, Attendance, Problem Solving, Quiz, Final Exam

COURSE CATEGORY

Course Category	Percentage
Support Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3
PY1	4	4	3	4
PY2	3	2	3	3
PY3	3	3	3	2
PY4	4	3	4	4
PY5	3	4	3	3
PY6	4	4	3	4
PY7	4	4	4	3
PY8	3	3	3	2
PY9	3	3	3	2
PY10	2	2	2	2
PY11	3	3	3	2
PY12	3	3	2	3
PY13	3	2	3	3
PY14	4	4	4	3
PY15	4	4	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)
Assignment 1	4	2	8
Quiz 1	4	2	8
Mid Term Exam Preparation	1	15	15
Final Exam Preparation	1	15	15
Class Hours (14 weeks)	14	3	42
Preliminary Study	14	2	28
Mid Term Exam 1	1	3	3
Final Exam	1	3	3
Further Study	14	5	70
		Total Workload	192
		Total Workload / 25.5 (s)	7.53
		ECTS Credit of the Course	8