Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Reactor Physics	FZ5061		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
Assistants	
Course Objectives	Provide information about nuclear interactions in the reactor, the reactor parameters and the principles of reactor operation.
Course Content	Elementary Particles, Atomic and Nuclear Structure, the excited state and Radiation. Nuclear Stability and Radioactive Decay, Nuclear Reactions, Binding Energy. Types of Interaction of Particles with matter. Nuclear Reactors and Nuclear Power. Neutron flux, Fick's Law, Discontinuity Equation, Diffusion Equation and Its Solution. Equation of One-Group Reactor, the reactor structure. One-group criticality equation, thermal and reflector reactors. Multi-Group Computing, Heterogeneous Reactors. Reactor Kinetics. Control rods, Temperature Effect on Reactivity. Radiation Protection, Nuclear reactor shielding. Reactor Safety and the Environment.
Course Learning Outcomes	1) After completion of this course students will be able to: have an idea of the nucleus models. 2) Recognize and analyze the nucleus reactions. 3) Examine the events of fission and fusion in details. 4) Understand in details the working principles of nuclear reactors

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Elementary Particles, Atomic and Nuclear Structure, the excited state and Radiation.	Lecturing Question-answer Homework	
2. Week	Elementary Particles, Atomic and Nuclear Structure, the excited state and Radiation.	Lecturing Question-answer Homework	
3. Week	Types of Interaction of Particles with matter.	Lecturing Question-answer Homework	

Quick Access

Physics (Master)
- 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

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

4. Week	Nuclear Reactors and Nuclear Power.	Lecturing Question-answer Homework	
5. Week	Neutron flux, Fick's Law, Discontinuity Equation, Diffusion Equation and Its Solution.	Lecturing Question-answer Homework	
6. Week	Equation of One-Group Reactor, the reactor structure.	Lecturing Question-answer Homework	
7. Week	Equation of One-Group Reactor, the reactor structure.	Lecturing Question-answer Homework	
8. Week	Mid-term Exam		
9. Week	One-group criticality equation, thermal and reflector reactors.	Lecturing Question-answer Homework	
10. Week	One-group criticality equation, thermal and reflector reactors.	Lecturing Question-answer Homework	
11. Week	Multi-Group Computing, Heterogeneous Reactors.	Lecturing Question-answer Homework	
12. Week	Reactor Kinetics.	Lecturing Question-answer Homework	
13. Week	Control rods, Temperature Effect on Reactivity.	Lecturing Question-answer Homework	
14. Week	Radiation Protection, Nuclear reactor shielding.	Lecturing Question-answer Homework	
15. Week	Reactor Safety and the Environment.	Lecturing Question-answer Homework	
16. Week	Final Exam		

RESOURCES

Recommended Sources
Henry Allan F., Nuclear Reactor Analysis, MIT Press; ASIN: 0262080818; 1980.
Duderstadt and Martin, Transport Theory, Wiley, New York, 1979.
Duderstadt J. J. and Hamilton L. J., Nuclear Reactor Analysis, John Wiley & Sons, Inc., 1976.
Miller W.F., Jr. (Editor), Lewis E. E., Computational Methods of Neutron Transport, American Nuclear Society; ASIN: 0471092452; Reprint edition January 1993.
Marchuk G., Lebedev V.I., Numerical Methods in the Theory of Neutron Transport, Taylor & Francis; ISBN: 3718601826; 2Nd&Rvsd edition, March 1986.
Davison B., Neutron Transport Theory, Oxford University Press, London,1957.

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	DK4
PY1	3	4	3	4	3
PY2	3	3	4	4	3

PY3	4	4	4	5	4
PY4	4	5	4	5	4
PY5	3	3	4	4	3
PY6	4	4	4	4	4
PY7	4	4	4	4	4
PY8	3	3	3	4	4
PY9	3	4	4	3	3
PY10	1	2	1	1	2
PY11	3	4	3	3	4
PY12	3	3	3	3	3
PY13	3	3	4	3	4
PY14	4	3	3	4	4
PY15	4	3	3	4	4

*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)
Mid Term Exam Preparation	1	15	15
Further Study	14	5	70
Quiz 1	4	2	8
Class Hours (14 weeks)	14	3	42
Preliminary Study	14	2	28
Final Exam Preparation	1	15	15
Mid Term Exam 1	1	3	3
Assignment 1	4	2	8
Final Exam	1	3	3
		Total Workload	192
		Total Workload / 25.5 (s)	7.53
		ECTS Credit of the Course	8