Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Radyasyon Transportunda Sayisal Yöntemler	FZ5048		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	Aim of the course is to give information on the basic principles of the radiation transport together with the numerical methods that are used to calculate photon-neutron transport solutions.
Course Content	Mathematical methods for the solution of neutron/photon transport problems, radiation shielding, reactor analysis and discrete directions and Monte Carlo methods applied in biomedical dosimetry, iterative techniques
Course Learning Outcomes	1) After completion of this course students will be able to: understand the basic principles of the radiation and radiation transport. 2) Have knowledge about mathematical and numerical methods such as Monte Carlo or iterative techniques 3) Gain the ability of using computers and the code for the calculation

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction to the neutron flux density and comparison of numerical methods: deterministic and scholastic	Oral Lecture	
2. Week	Revision of neutron transport and diffusion	Oral Lecture	
3. Week	Formulation of Neutron transport equation	Oral Lecture	
4. Week	Formulation of Neutron transport equation	Oral Lecture	
5. Week	Neutron transport code MCNP Monte Carlo simulations of neutron transport and introduction and examples of MCNP code.	Oral lecture	

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

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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

6. Week	Review: Fundamentals of numerical methods: numerical differentiation and integration, solutions of linear systems, finite difference method	Oral Lecture	
7. Week	Numerical solution of the Neutron Diffusion Equation.	Oral Lecture	
8. Week	Mid-term Exam		
9. Week	Introduction to Discrete Ordinate Methods	Oral Lecture	
10. Week	Discretization of the variables (time, energy and angle) in the neutron transport equation	Oral Lecture	
11. Week	Discretization of the variables (time, energy and angle) in the neutron transport equation	Oral Lecture	
12. Week	Spherical Harmonics: Formulation of the P-N equations	Oral Lecture	
13. Week	Discrete ordinates (Sn) methods and methods of solution	Oral Lecture	
14. Week	Introduction to Sn code PARTISAN and examples	Oral Lecture	
15. Week	Introduction to Sn code PARTISAN and examples	Oral Lecture	
16. Week	Final Exam		

RESOURCES

Recommended Sources
R.J. Schilling and S.L. Harris, "Applied Numerical Methods for Engineers using MATLAB and C", Brooks/Cole, CA (2000).
C. Pozrikidis, "Numerical Computation in Science and Engineering", Oxford University Press, NY(1998).
T.J. Akai, "Applied Numerical Methods for Engineers", J. Wiley & Sons, Inc, NY (1994).
E.E. Lewis and W.E. Miller, Jr., "Computational Methods of Neutron Transport", American Nuclear Society, IL (1993).
J.J. Duderstadt and L.J. Hamilton, "Nuclear Reactor Analysis", J. Wiley & Sons, NY (1976).

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	3	3	3	2
PY2	3	4	3	3
PY3	4	3	4	4
PY4	4	4	4	3
PY5	3	3	3	3
PY6	4	3	4	4
PY7	4	4	3	4
PY8	3	3	4	3
PY9	3	3	3	3
PY10	2	3	2	2

PY11	3	3	3	3
PY12	3	3	3	2
PY13	3	2	3	3
PY14	4	4	3	4
PY15	4	4	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)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	15	15
Mid Term Exam 1	1	3	3
Quiz 1	4	2	8
Assignment 1	4	2	8
Mid Term Exam Preparation	1	15	15
Further Study	14	5	70
Final Exam	1	3	3
Preliminary Study	14	2	28
		Total Workload	192
		Total Workload / 25.5 (s)	7.53
		ECTS Credit of the Course	8