Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Laser Design	FZ5021		3 + 0	3.0	7.5

Prerequisites	None
Language of Instruction	English
Course Level	Second Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assist. Prof. Dr. Mustafa KURT
Instructors	Assist. Prof. Dr. Mustafa KURT Assoc. Prof. Dr. Hilal GÖKTAŞ
Assistants	
Course Objectives	Investigation to principles of laser operation; excitation and oscillation problems in laser theory; standing and traveling waves in a laser and modes of oscillation of an optical cavity; stabilization and optimization conditions of a laser resonator; construction of solid state, gas lasers and liquid lasers and their parameters
Course Content	Nature of light, electromagnetic radiation, Energy levels and transitions, Population inversion Laser main components; pumping mechanism, Optical resonator, The conditions for stable optical resonator, Laser modes, Properties of laser radiations solid state laser materials solid state laser oscillator solid state laser amplifier solid state laser resonator solid state laser optical pump systems Gas laser Properties of DC discharge Atomic neutral gas laser Ion lasers Molecular gas laser Liquid, X-ray lasers
Course Learning Outcomes	1) comprehend the fundamentals of laser light and get acquainted about the components of laser 2) Calculate of laser gain, 3) comprehend how to classify laser types; solid state, gas, semi-conductor, X-ray lasers 4) design solid state, gas and liquid lasers and to determine the parameters 5)) define the principles of population inversion and calculate the gain.

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Nature of light, electromagnetic radiation, Energy levels and transitions, Population inversion	Face to face	
2. Week	Laser main components; pumping mechanism, Optical resonator,	Face to faceLecture	
3. Week	The conditions for stable optical resonator, Laser modes, Properties	Face to faceLecture	

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
- Assessment
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

	of laser radiations		
4. Week	Solid state laser materials	Face to faceLecture	
5. Week	Solid state laser oscillator	Face to faceLecture	
6. Week	Solid state laser amplifier	Face to faceLecture	
7. Week	solid state laser resonator	Face to faceLecture	
8. Week	Solid state laser optical pump systems	Face to faceLecture	
9. Week	Gas laser	Face to faceLecture	
10. Week	Properties of DC discharge	Face to faceLecture	
11. Week	Atomic neutral gas laser	Face to faceLecture	
12. Week	Ion lasers	Face to faceLecture	
13. Week	Molecular gas laser	Face to faceLecture	
14. Week	Liquid, X-ray lasers	Face to faceLecture	
15. Week	Review	Face to faceLecture	
16. Week	Final Exam	Written examLecture	

RESOURCES

Recommended Sources
Laser Fundamentals; W. T. Silvfast, Cambridge Un. Press, 2004, ISBN-13: 978-0521541053
Principles of Laser; O. Svelto, Springer, 1998, ISBN-13: 978-1441913012
Optoelectronics; An Introduction; J. Wilson, J. Hawkes, Prentice Hall PTR; 3rd edition, 1998, ISBN-13: 978-0136384953

ASSESSMENT

Measurement and Evaluation Methods and Techniques		
Midterm: 1 %30 Project: 1 %30 Final: 1 %40 TOTAL : 100		
In-Term Studies	**Quantity**	**Percentage**
Further Study	1	40
Total	1	40
End-Term Studies	**Quantity**	**Percentage**
Final Exam	1	60
Total	1	60
Contribution Of In-Term Studies To Overall Grade		40
End-Term Studies		60
Total		100

COURSE CATEGORY

Course Category	Percentage
Area of pecialization Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4	DK5
PY1	4	4	4	4	4	0

PY2	5	5	5	5	5	5
PY3	5	5	5	5	5	5
PY4	5	5	5	5	5	5
PY5	4	4	4	4	4	3
PY6	4	4	4	4	4	3
PY7	5	5	5	5	5	5
PY8	5	5	5	5	5	5
PY9	4	4	4	4	4	4
PY10	5	5	5	5	5	4
PY11	4	5	5	5	5	4
PY12	5	5	5	5	5	0
PY13	4	4	4	4	4	4
PY14	4	4	4	4	4	4
PY15	5	5	5	5	5	4

*DK = Course's Contrubution.

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

.

ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Final Exam	1	4	4
Assignment 1	5	4	20
Class Hours (14 weeks)	14	3	42
Presentation/Seminar	1	10	10
Mid Term Exam 1	1	30	30
Final Exam Preparation	1	20	20
Research&Project	1	25	25
Preliminary Study	10	1	10
Mid Term Exam Preparation	1	30	30
		Total Workload	191
		Total Workload / 25.5 (s)	7.49
		ECTS Credit of the Course	7