OPTICAL DESIGN

1	Course Title:	OPTICAL DESIGN
2	Course Code:	EEM4312
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	8
7	ECTS Credits Allocated:	4.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	Physics II Electromagnetic Field Theory
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Doç. Dr. UMUT AYDEMİR
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	Doç.Dr. Umut AYDEMİR
17	Website:	
18	Objective of the Course:	This course aims to provide Electrical and Electronics Engineering students with basic knowledge and skills about optical design principles, optical systems and components, optical materials and their applications. Students will gain the ability to solve optical design problems and develop optical systems by combining theoretical knowledge with practical applications.

19	Contribution of the Course to Professional Development:	1. Career in Photonics and Optoelectronics: Optical design is a rapidly growing sector in photonics and optoelectronics. This course provides students with the basic knowledge they need to build a career in these fields. It creates job opportunities in sectors such as telecommunications, laser technologies, imaging systems, and biomedical optics. The ability to use optical design software allows graduates to gain a competitive advantage in these sectors. 2. Multidisciplinary Working Skills: Optical design is a field that brings together different disciplines such as electricity, electronics, materials science, and physics. This course provides students with the ability to work on multidisciplinary projects and communicate with experts in different fields. 3. Problem Solving and Analytical Thinking Ability: Optical design requires the ability to analyze and solve complex problems. This course provides students with the ability to identify, model, and solve problems in optical systems. Analytical thinking, critical thinking, and problem solving skills are important for overall success in the field of engineering. 4. Adaptation to Technological Developments: New technologies and applications are constantly emerging in the field of optics. This course provides students with the ability to follow current

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	10	3.00	30.00
Homeworks	6	4.00	24.00
Projects	1	10.00	10.00
Field Studies	0	0.00	0.00
Midterm exams	1	2.00	2.00
Others	0	0.00	0.00
Final Exams	1	10.00	10.00
Total Work Load			116.00
Total work load/ 30 hr			3.87
ECTS Credit of the Course			4.00

20	Learning Outcomes:	Optical design knowledge allows students to develop their own optical products or systems and create entrepreneurial basic concepts of optical design. **2** Students will be able to recognize and analyze different **3** Students will be able to learn the properties and **4** Students will acquire the skills necessary to solve optical design problems. optical design software. **7** **8** **9** **10**
21	Course Content:	

Course Content:

Week	Theoretical	Practice
1	The nature and propagation of light, Huygens' principle, Fermat's principle, Snell's law, reflection and refraction.	
2	Geometric optics, thin lenses, lens equations, lens systems, mirrors.	

3	Optical aberrations, spherical aberration, coma, astigmatism, field curvature, distortion, correction of aberrations.	
4	Optical materials, refractive index, dispersion, transmittance, reflection, absorption.	
5	Prisms, prism types, light propagation in prisms, prism applications.	
6	Light sources, thermal light sources, lasers, LEDs, properties of light sources.	
7	Optical detectors, photodiodes, phototransistors, CCDs, CMOS sensors, properties of detectors.	
8	Imaging systems, human eye, camera, telescope, microscope, design of imaging systems.	
9	Fiber optic, fiber optic cables, fiber optic communication, fiber optic applications.	
10	Optical design software, Zemax, SPEOS, Code V, OSLO, use of optical design software.	
11	Optical design software II, Zemax, SPEOS, Code V, OSLO, use of optical design software.	
12	Lighting design, indoor lighting, outdoor lighting, lighting standards.	
13	Optical metrology, interferometers, spectrometers, optical measurement techniques.	
14	Current optical technologies, holography, metamaterials, photonic crystals.	

22	Textbooks, References and/or Other Materials:	Lecture notes, Eugene Hecht, Optics, 5th Ed, Pearson, 2016 "Fundamentals of Optics" by Francis A. Jenkins and Harvey E. White "Introduction to Optics" by Frank L. Pedrotti, Leno M. Pedrotti, and Leno S. Pedrotti "Modern Optical Engineering" by Warren J. Smith "Lens Design Fundamentals" by Rudolf Kingslake "Field Guide to Geometrical Optics" by John E. Greivenkamp Online Resources
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	0	0.00
Quiz	2	10.00
Home work-project	6	30.00
Final Exam	1	60.00
Total	9	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		Measurement and evaluation is carried out according to the priciples of Bursa uludag University Associate and Undergraduate Education Regulation.

24	ECTS / WORK LOAD TABLE

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	**1 very low**		**2 low**		**3 Medium**		**4 High**			**5 Very High**						