UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2020/2021
BACHELOR'S DEGREE (BSC)	ELECTRONICS ENGINEERING
SUBJECT	PRINCIPLES OF OPTICS
TYPE OF EDUCATIONAL ACTIVITY	F
AMBIT	10810-Altre conoscenze utili per l'inserimento nel mondo del lavoro
CODE	21236
SCIENTIFIC SECTOR(S)	
HEAD PROFESSOR(S)	BASILE SALVATORE Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	3
INDIVIDUAL STUDY (Hrs)	48
COURSE ACTIVITY (Hrs)	27
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Pass/Fail
TEACHER OFFICE HOURS	**BASILE SALVATORE** Tuesday 15:00 17:00 Viale delle Scienze, Edificio 6 (ex DIN), stanza 213. Nel periodo di non svolgimento di attivita didattica in presenza si svolge su piattaforma Teams, previa prenotazione via email. Thursday 15:00 17:00 Viale delle Scienze, Edificio 6 (ex DIN), stanza 213. Nel periodo di non svolgimento di attivita didattica in presenza si svolge su piattaforma Teams, previa prenotazione via email.

DOCENTE: Prof. SALVATORE BASILE

PREREQUISITES	Good knowledge of the “Fisica I” and “Analisi Matematica” topics. Having attended "Campi elettromagnetici" would be useful. Some familiarity with worksheets software and mathematical softwares would also be useful.
LEARNING OUTCOMES	Knowledge and understanding Theoretical understanding: have a good understanding of the fundamentals of optics (logical and mathematical structure, experimental support, and described physical phenomena) and their applications to engineering. Mathematical skills: be able to understand and master the use of the most commonly used mathematical methods. This will be verified during oral test. Applying knowledge and understanding Problem solving skills: be able to evaluate clearly the orders of magnitude in situations which are physically different, but show analogies, thus allowing the use of known solutions in new problems. Be able to solve simple optics problems using first principles. Modelling: be able to identify the essentials of a process / situation and to set up a working model of the same; be able to perform the required approximations. This will be verified during the oral test. Making judgements Be able to identify the more effective way to the solution of optics problems using the fundamental laws. Acquire an understanding of how optics laws are applicable to many fields, namely engineering. This will be verified during the oral test. Communications skills Be able to describe, analyse and solve optics problems using appropriate technical language and be able of written and oral communication on related subjects. Be able to describe the logical flowchart of problem solving. Be able to improve the group working skills. This will be verified during the oral test. Learning skills The student will learn the basic laws of optics and the typical methodology of the physical sciences, to be applied to engineering problems, critically and in an autonomous way. He will also improve the ability of autonomous learning. This will be verified during the oral test.
ASSESSMENT METHODS	The exam consists of an oral test, during which a report on a previously assigned subject will be presented and discussed. Purpose of the test: test the knowledge of the fundamentals of optics. EVALUATION CRITERIA MARK: PASSED Learning outcomes have been achieved in the following fields. KNOWLEDGE AND UNDERSTANDING Knowledge, understanding and integration of principles, concepts, methods and techniques of the discipline. APPLYING KNOWLEDGE AND UNDERSTANDING Evidence of relevant and perceptive application of theoretical and technical knowledge for tackling and solving problems. MAKING JUDGMENTS, COMMUNICATION SKILLS, LEARNING SKILLS Evidence of logical, analytical and critical abilities for reaching appropriate judgments and decisions. Ability to communicate knowledge, analyses and conclusions, with clearness, fluency and correct use of language. Abilities of concepts reinterpretation and interdisciplinary connection. MARK: NOT PASSED No knowledge, understanding and integration of principles, concepts, methods and techniques of the discipline. No evidence of relevant and perceptive application of theoretical and technical knowledge for tackling and solving problems. No evidence of logical, analytical and critical abilities for reaching appropriate judgments and decisions. No ability to communicate knowledge, analyses and conclusions, with clearness, fluency and correct use of language. No abilities of concepts reinterpretation and interdisciplinary connection.
EDUCATIONAL OBJECTIVES	Have a good understanding of the principles of optics. Be able to solve simple problems optics.
TEACHING METHODS	Lectures. Instructor-assisted resolution of exercises and problems. Classwork, for single students or groups. Teaching tools: blackboard, chalk sticks, blackboard eraser; computer and video projector. Numerical applications with the use of a computer.
SUGGESTED BIBLIOGRAPHY	Appunti delle lezioni e materiale didattico fornito dal docente. P. Mazzoldi, M. Nigro, C. Voci, "Elementi di Fisica Vol. 2 - Elettromagnetismo e Onde", II/2008, EdiSES, ISBN 9788879594783, capp. 10-16.

	P. Mazzoldi, M. Nigro, C. Voci, "Fisica Vol. II", II/1998, EdiSES, ISBN 8879591525, capp. 12-18. K.D. Moller, "Optics, Learning by Computing", 2nd, 2007, Springer, ISBN 978-0-387-26168-3. T.-C. Poon, T. Kim, "Engineering Optics with Matlab", 2006, World Scientific, ISBN 981-256-872-7. D.A. Steck, "Classical and Modern Optics", disponibile su http://atomoptics-nas.uoregon.edu/~dsteck/teaching/optics/. Altri testi liberamente disponiibili da Unipa (elenco fornito in dipendenza dell'anno accademico e degli accordi con le case editrici).

SYLLABUS

Hrs	Frontal teaching
2	Review on oscillations. Free, damped and forced harmonic oscillator. Resonance. Non-harmonic oscillations. Fourier analysis.
2	Wave phenomena. Waves differential equation. Longitudinal and transverse waves. Intensity.
2	Light reflection and refraction. Refraction index. Huygens-Fresnel principle. Polarization.
2	Geometrical Optics. Reflection and transmission. Mirrors. Thin lenses. Optical instruments.
2	Interference. Coherent light sources. Thin films. Young's experiment. Michelson interferometer. Electromagnetic waves interference.
2	Fraunhofer and Fresnel diffraction. Diffraction from a slit, a hole, a disc. Lens resolving power. Diffraction grating. Spectroscopy. X rays diffraction.

Hrs	Practice
3	Review on oscillations and other subjects.
3	Wave phenomena e altri argomenti.
3	Light reflection and refraction and other subjects.
3	Geometrical Optics and other subjects.
3	Interference and other subjects.
3	Fraunhofer e Fresnel diffraction and othe subjects.