EASTERN MEDITERRANEAN UNIVERSITY DEPARTMENT OF PHYSICS

COURSE CODE	**PHYS204**	COURSE LEVEL	Second Year
COURSE TITLE	**MODERN PHYSICS**	COURSE TYPE	Area Core
CREDIT VALUE	(4, 1) 4	ECTS VALUE	8 credits
PREREQUISITES	None	COREQUISITES	None
DURATION OF COURSE	One Semester	SEMESTER AND YEAR	Spring 2022-2023
WEBPAGES	http://staff.emu.edu.tr/huriyegursel, https://lms.emu.edu.tr/course/view.php?id=2735		

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CATALOGUE DESCRIPTION

This course aims to provide an environment in which the evolution of physical ideas belonging to special and general theories of relativity, quantum mechanics, atomic physics and high energy physics can be traced back in time and their roots can be investigated. Modern physics can be thought of as a collection of physical concepts mainly developed based on the studies conducted by the 19th and 20th century scientists. Hence, in addition to the concepts of modern physics, an insight on the transition between non-classical and modern physics is intended to be established with this course.

AIMS & OBJECTIVES

- To maintain a brief and compact understanding on the fundamental laws of physics before 20th century
- To construct an evolutionary timeline such that the necessity of modern physics is understood
- To grasp postulates of special theory of relativity and notice the similarities and distinctions between Einstein's viewpoint and other relativistic theories
- To get familiar with concepts of quantum mechanics and the associated scientists' perspectives
- To understand the particle properties of waves and vice versa
- To get a deep understanding on atomic models and achieve a comparison between them
- To expose students to an academic environment in which scientific ideas can be discussed and personal views on the subject can be shared freely

On the successful completion of this course, all students will have developed their skills in:

- formulating appropriate equations to solve problems;
- thinking critically and performing necessary analytic calculations in a logical order;
- modelling a physical problem from scratch
- delivering their ideas to others in a scientific way.

On successful completion of this course, all students will have developed their appreciation of, and respect for values and attitudes to:

- the discipline of physics as a fundamental branch of science that provides qualitative and quantitative explanations about the physical world;
- being an open-minded, curious, creative and reasoned skeptic;
- being aware of ethical issues in science.

GRADING CRITERIA	
A (excellent) ~85% and above	Excellent understanding of the concepts and the principles as demonstrated by correct and accurate knowledge and application of theory/laws in solving problems. Response to problems is clear, legible, concise and accurate. Excellent performance.
B (good) ~70% and above	Better than average understanding of the concepts and the principles as demonstrated by correct and accurate knowledge and application of theory/laws in solving problems, but does not have the depth and outstanding quality of an "A". Response to problems is fairly clear, legible, but occasionally contains some inaccuracies. Performance exceeds the minimum requirements.
C (average) ~60 % and above	An average understanding of the concepts and the principles as demonstrated by reasonably correct knowledge and application of theory/laws in solving problems, but doesn't have any depth. Response to problems is reasonably clear, legible, but contains inaccuracies. It reveals a sufficient understanding of the material, but lacks depth in understanding and approach/application. Content and form do not go beyond basic expectations and/or display some substantial errors. Acceptable but non-exceptional performance that does not go beyond the minimum requirements.
D (barely sufficient) ~50% and above	Minimal knowledge and barely sufficient understanding of the concepts and the principles as demonstrated by approximately correct application of theory/laws in solving problems. Response to problems is not very clear and is barely legible, and contains many inaccuracies. It reveals a minimum (confused) understanding of the material, and lacks depth in understanding and approach/application. Content and form do not adequately meet the basic expectations, and/or display significant errors. Performance demonstrates severe problems in one or more areas.
F (fail) Below 50%	Work does not meet the most minimal standards. It reveals no understanding of the material, lack of basic academic skills and knowledge, or completely incomprehensible writing. Performance is not acceptable.
NG nil grade	Not enough information to assign a letter grade.

METHOD OF ASSESSMENT

20% Coursework (4 Problem Sets, 5% Each)
80% Written Examination - **35%** Midterm Examination
45% Final Examination
5% Bonus (TBA)

IMPORTANT NOTES

If the student does not attend the midterm and final examinations (or their make-ups), the grade NG will automatically be assigned.

Make-up Exam:

Students having not attended the midterm exam or final exam are entitled to enter the make-up exam to be held after the final exam period.

Objections: Graded exam papers will be available for inspection upon request. According to the regulations of the University, any objections or re-grade requests should be made within a week of the announcement of grades.

Main Textbook (REQUIRED)

Kenneth S. Krane, *Modern Physics,* 3rd Edition

Additional Reading Materials (Not Compulsory, but Recommended)

A. Beiser, *Concepts of Modern Physics,* 5th Edition

A. P. Arya, *Elementary Modern Physics*

T. M. Helliwell, *Special Relativity*

A. Einstein, *"Zur Elektrodynamik bewegter Körper"* published in Annalen der Physik (Leipzig), 17 (1905) 891

M. Planck "The Theory of Heat Radiation" (1914), translated into English by Morton Masius

J. C. H. Spence, *Lightspeed: The Ghostly Aether and the Race to Measure the Speed of Light* (Oxford, 2019; Oxford Academic)

ACADEMIC DISHONESTY

Cheating is copying from others or providing information, written or oral, to others. According to university by-laws cheating is a serious academic dishonesty case punishable with disciplinary action including a letter of official warning and/or suspension from The University for up to one semester. Disciplinary action is written in

PLEASE KEEP THIS COURSE SYLLABUS FOR REFERENCE AS IT CONTAINS IMPORTANT INFORMATION!

			COURSE SCHEDULE
Week	**Tutorial**	**Lecture**	**Topics**
2	-	08-09 Mar (L1-L2)	Overview of Classical Physics & Birth of Modern Physics
3	13 Mar (T1)	15-16 Mar (L3-L4)	Timeline of the Relativistic Perspective
4	20 Mar (T2)	22-23 Mar (L5-L6)	Special Theory of Relativity & Its Implications
5	27 Mar (T3)	29-30 Mar (L7-L8)	Particle-like Properties of Electromagnetic Radiation
6	03 Apr (T4)	05-06 Apr (L9-L10)	Particle-like Properties of Electromagnetic Radiation c.o.f.
7	10 Apr (T5)	12-13 Apr (L12-L13)	Wave-like Properties of Particles
8	17 Apr (T6)	19-20 Apr (L14-15)	Wave-like Properties of Particles c.o.f.
9-10			**Midterm Examination Period**
11		10-11 May (L16-L17)	Evolution & Key Concepts in Quantum Mechanics
12	15 May (T7)	17-18 May (L17-L18)	Evolution & Key Concepts in Quantum Mechanics c.o.f.
13	22 May (T8)	24-25 May (L20-L21)	Atomic Structure
14	29 May (T9)	01-02 May (L22-L23)	Atomic Structure c.o.f.
15	06 Jun (T10)	08-09 Jun (L24-L25)	Franck-Hertz Experiment & Correspondence Principle
16-17-18			**Final Examination Period**