

Module Outline

1. GENERAL

SCHOOL		OF SCIENCE AND TECHNOLOGY	
PROGRAMME		Studies in Natural Sciences	
LEVEL OF STUDIES		Level 6 of the Hellenic and European Qualifications Framework	
MODULE CODE	FYE24	YEAR	2
MODULE TITLE	CLASSICAL PHYSICS I		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		HOURS	CREDITS
(12-13 hours) x 32 weeks		392	14 ECTS
MODULE TYPE <i>Compulsory/Elective/ Mandatory Optional</i>	Compulsory		
MODULE DESCRIPTION <i>general background, special background, specialised, general knowledge, skills development</i>			
Special scientific background			
PREREQUISITE MODULES	ΦYE14		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek		
IS THE MODULE OFFERED TO ERASMUS STUDENTS	No		
MODULE WEBSITE (URL)	The Module has its own space in the digital learning environment of HOU (https://study.eap.gr/login/index.php) with controlled access (using a code) for students and Teaching Staff. The Module has its own space in the digital learning environment of HOU (https://study.eap.gr/login/index.php) with controlled access (use of password) for students and Teaching Staff. The electronic Web page of the FYE-24 Module is the following: https://study.eap.gr/course/view.php?id=137		

2. LEARNING OUTCOMES

Learning outcomes

The learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the Module are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

LEARNING OUTCOMES

Knowledge:

Upon successful completion of the Module, students are expected to:

- Demonstrate a deep understanding of the Newtonian approach and conservation principles (energy, momentum, angular momentum).
- Analyze the motion and equilibrium of rigid bodies, including moments of inertia and rotation around fixed or non-fixed axes.
- Understand non-inertial reference frames, including Coriolis and centrifugal forces.
- Fully understand electric charge, fields, and potential.
- Understand time-varying field phenomena, such as Electromagnetic Induction and displacement currents.
- Understand the theory of electromagnetic waves and their propagation in a vacuum and matter.

Skills:

Upon successful completion of this Module, students will be able to:

- Analyze particle system dynamics and collisions.
- Solve coupled harmonic oscillator systems and understand normal modes of oscillation.
- Calculate electrostatic fields and potentials from discrete and continuous charge distributions using Gauss's Law and the Poisson/Laplace equations.
- Analyze the behavior of conductors and dielectrics in electric fields.
- Calculate magnetic fields from steady currents (Biot-Savart Law, Ampere's Law) and analyze charge motion in magnetic fields.
- Apply Maxwell's four equations (in both integral and differential forms) to describe classical Electrodynamics.

Competences:

Upon successful completion of the module, students are expected to:

- Solve complex problems involving point mass motion in one, two, and three dimensions, including motion in central force fields.
- Apply basic concepts of Lagrangian and Hamiltonian mechanics.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the Module aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

The course fosters skills in autonomous and team work, decision-making, analysis/synthesis of data, and the promotion of free, creative, and inductive thinking.

- Search for, analysis and synthesis of data and information by the use of appropriate technologies
- Adaptation to new situations
- Decision-making

- Individual/Independent and autonomous work
- Respect for the natural environment
- Exercise of criticism and self-criticism
- Working in an interdisciplinary environment
- Development of free, creative, and inductive thinking

3. SYLLABUS

Purpose of Module

Objective: To deepen understanding of the fundamental principles of the macrocosm, focusing on Mechanics and Electromagnetism. Students study motion ranging from material points to rigid bodies, and the theory of electric/magnetic fields, culminating in full Electrodynamics and Maxwell's equations.

Subjects covered

The subjects of the module include the following:

1. Mechanics
2. Electromagnetism

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	• Distance teaching and learning with six (6) Group Counseling Meetings (GCMs) of 4-hour duration each, during the academic semester on weekends. • Distance learning with six (6) Supportive Group Counseling Meetings (SGCMs) of 1 hour duration each, with emphasis and focus on methodology of problems and exercises solving. • Personal communication and feedback (advisory role of Adjunct Faculty members).								
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	During GCMs, SGCMs, and teaching the following are used: • Remote meetings tools (Webex, Teams, Zoom), • Presentation software (PowerPoint, educational videos–animations, etc.), • Specialized software ((Mathematica, Google collab, Matlab). In addition, students use office automation tools, text-editors, web browsers and e-reader for digital books. <u>Communication with the students is supported by:</u> • The digital platform of HOU (https://study.eap.gr/login/index.php) (course information, educational material posts, announcements, messages, examination results, user groups, discussion fora, etc.). • E-mail • Meetings through Zoom • Telephone consultations								
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements,</i>	<table border="1"> <thead> <tr> <th>Activity</th><th>Year Workload</th></tr> </thead> <tbody> <tr> <td>6 (GCMs) (x 4 hours each)</td><td>24</td></tr> <tr> <td>6 (SGCMs) (x 1hour each)</td><td>6</td></tr> <tr> <td>6 Written Reports (x 10 hours each)</td><td>60</td></tr> </tbody> </table>	Activity	Year Workload	6 (GCMs) (x 4 hours each)	24	6 (SGCMs) (x 1hour each)	6	6 Written Reports (x 10 hours each)	60
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6 (SGCMs) (x 1hour each)	6								
6 Written Reports (x 10 hours each)	60								

<i>clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<table border="1"> <tr> <td>Personal Study (9-10 hours x 32 weeks)</td><td>297</td></tr> <tr> <td>Exams (5hours)</td><td>5</td></tr> <tr> <td>Total Workload</td><td>392</td></tr> </table>	Personal Study (9-10 hours x 32 weeks)	297	Exams (5hours)	5	Total Workload	392
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STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Students' evaluation – Grade assessment of a Module: • Undertaking six (6) written assignments during the academic year. The average of the grades contributes to the formulation of the final grade of the module by 30%, if that grade allows further participation. • As a prerequisite to participation in the final exam, the cumulative grade of all six written assignments should be 30 (6x5=30). • The score of the written assignments (WA) is activated only with an average score equal to or above the base (≥ 5) in the final or make-up exams. • Final written exams, the grade of which contributes to the formulation of the final grade of the module by 70% (35% for the examination of Part 1 and 35% for the examination of Part 2). • The final grade of the module, on a 0 – 10 scale is calculated as follows $\text{Final Grade} = (\text{WA mean} \times 0,30) + (\text{Grade exam Part 1} \times 0,35) + (\text{Grade exam Part 2} \times 0,35)$ • All evaluation criteria are posted on the course website https://www.eap.gr/el/programmata-spoudwn/177-spoudes-stis-fysikes-epistimes/diarthrws/403-4fc8fd8087500c236e505bdcc5e793bf Language of evaluation: Greek Part 1 may be examined on February, June or July, while Part 2 may be examined on June or July. Students can retake exmas during the year for improving their grade.						

5. ATTACHED BIBLIOGRAPHY

• Suggested Bibliography Kibble T.W.B., Berkshire F.H., Classical Mechanics, transl. & ed. Ditsas P. & Sardelis D., Crete University Press, 2012. Griffiths J. D., Introduction to Electrodynamics, 2nd edition, Crete University Press, 2012.
