BACHELOR 'S PROGRAMME
3rd YEAR OF STUDY, 2nd SEMESTER

COURSE TITLE	INTRODUCTION TO MODELLING OF PHYSICAL PROCESSES
COURSE CODE	
COURSE TYPE	full attendance
COURSE LEVEL	1st cycle (bachelor's degree)
YEAR OF STUDY, SEMESTER	3rd year of study, 2nd semester
NUMBER OF ECTS CREDITS	5
NUMBER OF HOURS PER WEEK	4 (2 lecture hours + 2 seminar hours)
NAME OF LECTURE HOLDER	Lect.dr. Petronel POSTOLACHE
NAME OF SEMINAR HOLDER	Lect.dr. Petronel POSTOLACHE
PREREQUISITES	Advanced level of English

A GENERAL AND COURSE-SPECIFIC COMPETENCES

General competences:

→ Elaboration of a specialty or licence work, respecting the objectives, proposed deadlines and norms of professional ethics.

→ Realization of a project/ team activity and identification of specific professional roles.

→ Elaboration, drafting and presentation in Romanian and/ or in a language of international circulation of a specialty work on a current topic in the field.

Course-specific competences:

→ Identification of IT basics use (algorithms, programming languages, specific software, numerical modeling) in the study of Physics.

→ C 2.2 Explanation of the specific steps needed to develop algorithms for solving average difficulty problems.

→ Comparison of the results given by numerical models or simulations of physical phenomena with data provided by literature and/ or experimental measurements.

→ Proper use of numerical methods and mathematical statistics in the analysis and processing of specific physical data

→ Elaboration of graphs and reports for explaining and interpreting physical results obtained by statistical methods.

→ Proper use in professional communication of the terminology specific to Physics but also to related domains (especially Mathematics)

→ Presentation of scientific and popularization seminars on topics such as Atomic Physics, Nuclear and Elementary Particles Physics, Quantum Mechanics, Material Physics, Optics.

B LEARNING OUTCOMES

- Familiarize the students with the methodology of modeling physical systems from physical phenomena to mathematical forms followed by analytical or numerical solving.
- Developing students' abilities to use mathematical platforms such as Maple, Mathematica to solve modeling problems for physical systems.

C LECTURE CONTENT

- General introduction. Physical systems and processes
- Introduction to Maple simulation software
- Algebra calculus in Maple. Solving equations
- 2D and 3D plots.
- Solving ordinary differential equations
- Solving partial differential equations
- Simulation of a physical process

D RECOMMENDED READING FOR LECTURES

1. http://stoner.phys.uaic.ro/moodle
2. James Claycomb -Mathematical Methods for Physics using Matlab and Maple
3. - Angela B. Shiflet George W. Shiflet -Introduction to Computational Science: Modeling and Simulation for the Sciences (Second Edition)

E SEMINAR / LABORATORY CONTENT

- Experimental physics / Computational physics
- Numerical calculation. Type of errors/aproximations.
- Maple software
- 2D, 3D graphs
- Solving differential equations

	• Example: RLC circuit. • Project proposal and discussion of requirements • Individual project work • Project presentation
F	RECOMMENDED READING FOR SEMINARS
	1. http://stoner.phys.uaic.ro/moodle 2. Maple software Manual/Help
G	EDUCATION STYLE
LEARNING AND TEACHING METHODS	Lecture, exemplification Illustration, discussion
ASSESSMENT METHODS	Written test Individual project, active participation in the laboratory, involvement in group and individual tasks
LANGUAGE OF INSTRUCTION	English