COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Industrial Design and Production Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	A2	**SEMESTER**	1st
COURSE TITLE	Analysing Physical Processes		

INDEPENDENT TEACHING ACTIVITIES *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*	WEEKLY TEACHING HOURS	CREDITS
Lectures	3	8
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://msc-circular.uniwa.gr/course/analysing-physical-processes/

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course 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*

The course belongs to Level 7 of the European Qualifications Framework. Therefore, upon completion of the course students will have:

• Thorough knowledge and critical understanding of the basic principles and laws of Physical Processes.

• Knowledge and skills in using the methods and the most basic techniques of Environmental Physics.

• Knowledge and skills in handling simple relations of physical processes in order to predict their behavior within the framework of circular economy and sustainability strategies.

In detail, students will be able to:

• Predict the behavior of physical systems, and select the appropriate parameters to achieve the desired behavior.

• To correlate physical systems and to decide if they are within the framework of circular economy and sustainability strategies.

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 course 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* *……* *Others…* *…….*

• Search for, analysis and synthesis of data and information, with the use of the necessary methodology
• Adapting to new situations
• Decision-making
• Working independently
• Team work
• Working in an international environment
• Working in an interdisciplinary environment
• Respect for the natural environment
• Production of new research ideas
• Production of free, creative and inductive thinking

(3) SYLLABUS

The aim of the course is the introduction to the analysis and design of basic physical processes. Modules include introduction, fundamentals of process analysis and design, analysis and design of experiments, and fluid flow mechanics. Concepts such as thermal processes with simultaneous mass transfer, particle mechanics (filtration, centrifugation, sedimentation, cyclones, filters, crystallization, fracture, agglomeration), will be analyzed and explained to the program participants. This course is obligatory for students of the master's programme. The course provides knowledge of the core tools used in the area of Circular Economy, their philosophy and their position in the field. Students are trained in the applicability of these tools by working on case studies with the aid of specific software-tools. The core modules of the course include:

- Physical process
- Long wave radiation
- Short wave radiation
- Ocean model
- Deep convection
- Solar energy
- Physical and Chemical properties and changes
- The water cycle
- Geophysical processes

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face and distance learning.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	ICT is used in this course, both for teaching and for communicating with students.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *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*	

Activity	*Semester workload*
Theoretical part with Lectures	40
Analysis of bibliography	16
Interactive teaching	16
Project/essay writing	32
Individual study	56
Course total	*160*

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Language of Assessment: English The assessment of students is done with written exams at the end of the semester that include theory questions in various forms (e.g., multiple choice, short answer, filling in the gap, etc.). Final written exam: 80% Project/essay writing: 20% The assessment criteria are announced to the students at the beginning of the semester and are posted on the course's website in eClass.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- *Ettwein V. & Maslin M. (2011). "Physical geography: fundamentals of the physical environment". London: University of London.*
- *Gabler R.E., Petersen J.F., Trapasso L.M. & Sack D. (2009). "Physical Geography" (Ninth Edition). Belmont, CA: Brooks/Cole, Cengage Learning. ISBN-13: 978-0-495-55506-3.*
- *Goudie A. (2006). "The human impact on the natural environment: past, present, and future" (6th ed.). Malden, MA: Blackwell Publishing. ISBN-13: 978-1-4051-2704-2.*
- *Holden J. (2011). "Physical geography: the basics". London and New York: Routledge. ISBN: 0-203-81714-1.*
- *Jacobson M.Z. (2005). "Fundamentals of Atmospheric Modeling" (Second Edition). New York, NY: Cambridge University Press. ISBN-13: 978-0-511-11115-0.*
- *Mason N. & Hughes P. (2001)." Introduction to Environmental Physics: Planet Earth, Life and Climate". London and New York: Routledge. ISBN-13: 978-0748407651.*
- *Msabila D.T. (n.d.). "Environmental Science & Geography: Climatology and Soil Science" (Second Edition). The Knowledge Without Frontiers.*
- *Primack A. (2014). "The Environment and Us". St. Thomas, US Virgin Islands: Prophet Press Publishing.*
- *The Diagram Group (2006). "The Facts On File Earth Science Handbook" (Revised Edition). New York, NY: Infobase Publishing. ISBN: 0-8160-5879-2.*
- ***Journal circular economy** https://www.sciencedirect.com/journal/circular-economy*
- ***Journal Circular Economy and Sustainability** https://www.springer.com/journal/43615/aims-and-scope*
- ***Journal sustainability** https://www.mdpi.com/journal/sustainability*