

MODULE INFORMATION SHEET

Name of Module Unit	Environmental Fluid Mechanics
Name in polish language	Środowiskowa mechanika płynów
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Chair of Environmental Protection and Management
Responsible person	Prof. Lech Łobocki

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
1	30E			15		4

Learning outcomes (knowledge, skills, competences)

Mastering basic knowledge of fluid mechanics as applied to geophysical flows and other environmental problems. Knowledge of basic laws and theories of hydrodynamics with application to particular environmental problems. Computer assignments using Python give the students an opportunity to practice the application of theoretical knowledge to computer-based problem solving. Competences: confirmed ability of applying knowledge in particular problems and applications.

Prerequisites

Calculus, Information Technology

Rules for integrated grade setting

60% exam, 40% computer exercises

Recommended readings

Vallis G., 2019: Essentials of Atmospheric and Oceanic Fluid Dynamics
 Kundu P.K., Cohen I.M., 2008: Fluid Mechanics
 Cushman-Roisin B., Beckers J.-M., 2007: Introduction to Geophysical Fluid Dynamics

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Gradient and advection	2	S
2	Divergence	2	S
3	Conservation laws	4	S
4	Vorticity	2	S
5	Classical field theory	4	S
6	Shallow water theory	6	S
7	Vorticity budget	2	S
8	Compressible and viscous fluid dynamics	4	S
9	Approximations	2	S
10	Dimensional analysis and similarity	2	S
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Lecturers

Dr hab inż. Lech Łobocki – prof. PW

Assessment method

Written exam

Contents of computer exercises

	Topics	Time (hrs.)	Scope (S / Ex)
1	Principles of computational fluid dynamics. Numerical integration	2	S
2	Gradient and advection	3	S
3	Computation of potential flows	4	S
4	Shallow water model	6	S
Total		15	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Persons responsible for computer exercises

Dr hab inż. Lech Łobocki – prof. PW

Assessment method for computer exercises

Grading assignment reports, active participation in classes