DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUPERVISOR DECLARING/CONDUCTING COURSE: Sławomir Pietrowicz, PhD, DSc
DEPARTMENT: Faculty of Mechanical and Power Engineering
SCIENTIFIC DISCIPLINE: ENVIRONMENTAL ENGINEERING, MINING AND ENERGY

COURSE CARD

Course name in Polish: Modelowanie wybranych procesów cieplno-przepływowych przy użyciu zaawansowanych narzędzi numerycznych typu CFD
Course name in English: Modelling of selected thermal-fluid processes using advanced numerical tools such as CFD

Course language: ~~polish~~ / english

The course is intended for all PhD students: YES / ~~NO~~

1) BASIC COURSE
2) ~~SPECIALIST COURSE~~
3) ~~SEMINAR~~
4) ~~HUMANISTIC COURSE~~
5) ~~LANGUAGE~~
6) ~~RESEARCH SKILLS~~

Subject code: IGQ100231W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	15			
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to create 3-D geometry in engineering software.
2. Knowledge of heat transfer and fluid mechanics.
3. Basic knowledge of partial differential equations

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COURSE OBJECTIVES

C1 - to impart knowledge on the methods of simulating thermal-flow phenomena
C2 - to develop the ability to select a numerical mesh for a given geometry
C3 - training of the ability to perform numerical calculations for simple and complex heat-flow phenomena;
C4 - learn the ability to make calculations for thermal-flow problems defined by the student.

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PROGRAM CONTENTS

Form of classes		Number of hours
Lec1	Organisational matters. Introduction to Computational Fluid Dynamics (CFD).	2
Lec2	Description of heat transfer equations and flow phenomena.	2
Lec3	Modelling of heat transfer processes in ANSYS CFX	2
Lec4	Modelling of thermal-fluid processes for laminar flows in ANSYS CFX	2
Lec5	Analysis of turbulence phenomena using selected examples in ANSYS CFX	2
Lec6	Process modelling for multiple numerical domains	2
Lec7, Lec8	Analysis of multiphase flow phenomena with selected examples in ANSYS CFX	3
	Total hours	15

TEACHING TOOLS USED

N1. Multimedia presentation.
N2. Software for generating geometry and numerical meshes e.g. Mesh and SpaceClaime.
N3. Software for simulations e.g. CFD ANSYS CFX.
N4. Consulting

ACHIEVED SUBJECT LEARNING OUTCOMES

Type of learning outcome	Code of learning outcome	Assessment of learning outcome
knowledge	P8S_WG	has an advanced knowledge fundamental to a field relevant to his/her research, including the most advanced methods of research and verification of results achieved

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Patankar S., Numerical Heat Transfer And Fluid Flow, McGraw-Hill, Book Company, 1980.
[2] Versteeg H. K., Malalasekera W., An Introduction to Computational Fluid Dynamics. The Finite Volume Method, 2nd ed., Pearson Education Limited, 2007.
[3] Anderson J. D., Computational Fluid Dynamics. The Basics with Applications., McGraw-Hill Book Company, 1995.
[4] Jaworski Z., Numeryczna mechanika płynów w inżynierii chemicznej i procesowej.

SECONDARY LITERATURE:

[1] Tannehill J. C., Anderson D. A., Pletcher R. H., Computational Fluid Mechanics And Heat Transfer, Taylor & Francis, 1997.
[2] Ferziger J. H., Peric M., Computational Methods For Fluid Dynamics, 3rd ed., Springer, 2007.
[3] Hoffmann K. A., Chiang S. T., Computational Fluid Dynamics, 4th edition, vol. I,II,III, Engineering Education System, 2000.

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SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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