

## WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

<b>FACULTY OF</b> Fundamental Problems of Technology
<b>SUBJECT CARD</b>
Course name in Polish: Zaawansowane modelowanie za pomocą systemu algebry komputerowej <i>Maple</i>
Course name in English: Advanced Scientific Modeling using Computer Algebra System <i>Maple</i>
Course language: english
University-wide general course type: 1) <u>basic course (mathematics, physics, chemistry, other)</u> 2) humanity course 3) managerial skills 4) English language 5) other modern language Departmental course developing professional skills: 1) specialized course 2) <u>interdisciplinary course</u> 3) seminar (interdisciplinary, specialized, departmental)
Type of course (obligatory, optional): optional
<b>Educational effects according to ZW 26/2017:</b> <b>P8S_WG, P8S_UW, P8S_UK, P8S_KR</b>
Subject code: <b>FTP009001</b>

\*delete as applicable

	Lecture	Laboratory	Seminar
Number of hours of organized classes in University (ZZU)	30		
Number of hours of total student workload (CNPS)	90		
Form of crediting	Exam **	Exam / crediting with grade*	Oral presentation
Number of ECTS points	3		
including number of ECTS points for practical (P) classes	0		
including number of ECTS points for direct teacher-student contact (BK) classes	2		

\*delete as applicable \*\*In case of didactic courses also inspections and evaluation classes

<b>PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES</b>
<ol style="list-style-type: none"> <li>1. Basic programming skills</li> <li>2. Basic English language</li> <li>3. Completing course “Modelling of physical processes and phenomena using Computer Algebra Systems” or sound practical skills in using <i>Maple</i></li> </ol>

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SUBJECT OBJECTIVES	
C1	Acquire advanced skill in using CAS <i>Maple</i>
C2	Acquire skills to use <i>Maple</i> for solving chosen advanced problems in science and for modeling of chosen phenomena and processes in physics

SUBJECT EDUCATIONAL EFFECTS	
relating to knowledge:	
PEK_W01	has deep sound knowledge related to CAS <i>Maple</i>
PEK_W02	has advanced knowledge in classical and quantum physics
relating to skills:	
PEK_U01	can use <i>Maple</i> for solving/modelling of advanced problems/phenomena in physics
PEK_U02	can analyze advanced <i>Maple</i> worksheets
relating to social competences:	
PEK_K01	awareness of the role of popularization of science

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours
Lec1	Introduction and summary of <i>Maple</i> : basic and advanced features	2
Lec2	Dynamical systems: Phase plane portraits	4
Lec3	Dynamical systems: Phase plane analysis	4
Lec4	Linear ordinary differential equation models	3
Lec5	Nonlinear ordinary differential equation models	3
Lec6	Linear partial differential equation models: part 1	4
Lec7	Linear partial differential equation models: part 2	3
Lec8	Hunt for solitons	3
Lec9	Nonlinear diagnostic tools	4
Total hours		<b>30</b>

TEACHING TOOLS USED	
N1	Lecture
N2	Computer lab (during the lecture)

EVALUATION OF ACHIEVED SUBJECT EDUCATIONAL EFFECTS		
<b>Evaluation:</b> F – forming (partial) C – concluding	Educational effect number	Way of evaluating achievement of educational effects

## WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

F1	PEK_W01, PEK_W02 PEK_U01, PEK_U02, PEK_K01	control of correctness of implementation of Maple worksheets, discussions
F2	PEK_W01, PEK_W02 PEK_U01, PEK_U02, PEK_K01	seminar-like presentation of a solution/ modeling of chosen problem/process in physics/mathematics or other areas
C= F1/4+3*F2/4		

## PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

- 1] R.H. Enns, *Computer Algebra Recipes for Mathematical Physics* (Birkhauser, Boston, 2005)
- [2] R.H. Enns, G.C. McGuire, *An Advanced Guide to Scientific Modeling* (Springer, New York, 2007)
- [3] A.C. Mituś, R. Orlik, G. Pawlik, *Wstęp do pakietu algebry komputerowej Maple* (Oficyna Wydawnicza DWSPiT, Polkowice, 2010) (in polish)

**SUBJECT SUPERVISOR**

(NAME AND SURNAME, E-MAIL ADDRESS)

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