COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S1-ME-201**
	part-time programme:	
Course title in Polish	**Matematyka w zastosowaniach inżynierskich**	
Course title in English	**Engineering Mathematics**	
Valid from (academic year)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**first-cycle**
Type of education	**academic**
Mode of study	**full-time programme**
Specialism	**all**
Department responsible	**Department of Mathematics and Physics**
Course leader	**dr hab. Beata Maciejewska, prof. PŚk.**
Approved by	**dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering**

COURSE OVERVIEW

Course type		**programme-specific**
Course status		**compulsory**
Language of instruction		**English**
Semester of delivery	full-time programme	**Semester II**
	part-time programme	
Pre-requisites		**Calculus**
Examination required (YES/NO)		**YES**
ECTS value		**4**

Mode of instruction		lecture	class	laboratory	project	seminar
No. of hours per semester	full-time programme	**15**	**30**			
	part-time programme					

LEARNING OUTCOMES

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code

Fundusze Europejskie
dla Rozwoju Społecznego

Rzeczpospolita
Polska

Dofinansowane przez
Unię Europejską

Knowledge	W01	Students understand the basic concepts of integral calculus for functions of two variables and the appropriate mathematical notation. They know the principles of constructing and solving simple mathematical models described by differential equations.	MiBM1_W01
	W02	They know standard computational procedures for integral calculus problems. They know the applications of selected mathematical topics in engineering.	MiBM1_W01
	W03	They understand the abstract aspect and formal language of mathematics.	MiBM1_W01
Skills	U01	They are proficient in solving complex calculus problems (such as computing double integrals and line integrals, and solving differential equations).	MiBM1_U01 MiBM1_U12
	U02	They are skilled in using mathematical language and accurately recording mathematical operations with the correct notation.	MiBM1_U01
Competence	K01	Is ready to critically evaluate his/her knowledge and seek expert opinions in case of difficulties in solving a problem on his/her own.	MiBM1_K01
	K02	Students understand the need for lifelong learning.	MiBM1_K03

COURSE CONTENT

Type of instruction lecture	Topics covered
lecture	Definition and properties of a double integral. Double integral in the normal range. Change of the order of integration in a double integral. Change of variables in double integrals. Line integrals. Line integral of a vector field. Line integral of a scalar field. Green's Theorem. Applications of the double integral and the line integrals in mechanics. Basic concepts of ordinary differential equations. Separable Equations. Linear Equations. The method of variation of a parameter and the method of undetermined coefficients.
class	Determining the limits of integration in a double integral. Calculating the double integral over a normal region. Change of variables in a double integral. Calculating the line integral of a vector field and the line integral of a scalar field. Applying Green's theorem to calculate the vector line integral. Calculating physical quantities using a double integral and lines integrals. Differential equations with separable variables. Homogeneous and non-homogeneous first-order linear differential equations. The method of variation of a parameter. Higher-order linear differential equations with constant coefficients. The method of undetermined coefficients.

ASSESSMENT METHODS

Outcome code	Methods of assessment					
	Oral examination	Written examination	Test	Project	Report	Other
W01		X	X			
W02		X	X			
W03		X	X			
U01		X	X			

Politechnika Świętokrzyska
Kielce University of Technology

Projekt „Dostosowanie kształcenia w Politechnice Świętokrzyskiej do potrzeb współczesnej gospodarki" nr FERS.01.05-IP.08-0234/23

WMiBM | Wydział Mechatroniki i Budowy Maszyn

U02		X	X			
K01						X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	examination assessment	Achieving at least 50% of the points on the written exam.
class	non-examination assessment	Achieving a total of at least 50% of the points on the written tests.

OVERALL STUDENT WORKLOAD

<table>
<tr><th colspan="13">ECTS weighting</th></tr>
<tr><th rowspan="3">No.</th><th rowspan="3">Activity type</th><th colspan="10">Student workload</th><th rowspan="3">Unit</th></tr>
<tr><th colspan="5">full-time programme</th><th colspan="5">part-time programme</th></tr>
<tr><th>L</th><th>C</th><th>Lb</th><th>P</th><th>S</th><th>L</th><th>C</th><th>L b</th><th>P</th><th>S</th></tr>
<tr><td>1.</td><td>Scheduled contact hours</td><td>15</td><td>30</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>h</td></tr>
<tr><td>2.</td><td>Other contact hours (office hours, examination)</td><td>4</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>h</td></tr>
<tr><td>3.</td><td>Total number of contact hours</td><td colspan="5">51</td><td colspan="5"></td><td>h</td></tr>
<tr><td>4.</td><td>Number of ECTS credits for contact hours</td><td colspan="5">2,0</td><td colspan="5"></td><td>ECTS</td></tr>
<tr><td>5.</td><td>Number of independent study hours</td><td colspan="5">49</td><td colspan="5"></td><td>h</td></tr>
<tr><td>6.</td><td>Number of ECTS credits for independent study hours</td><td colspan="5">2,0</td><td colspan="5"></td><td>ECTS</td></tr>
<tr><td>7.</td><td>Number of practical hours</td><td colspan="5">67</td><td colspan="5"></td><td>h</td></tr>
<tr><td>8.</td><td>Number of ECTS credits for practical hours</td><td colspan="5">2,7</td><td colspan="5"></td><td>ECTS</td></tr>
<tr><td>9.</td><td>Total study time</td><td colspan="5">100</td><td colspan="5"></td><td>h</td></tr>
<tr><td>10.</td><td>ECTS credits for the course
<i>1 ECTS credit = 25-30 hours of study time</i></td><td colspan="10">4</td><td>ECTS</td></tr>
</table>

READING LIST

1. Hożejowska S., Hożejowski L., Maciąg A., Matematyka w zadaniach dla studiów ekonomiczno-technicznych, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2005.
2. Krysicki W., Włodarski L., Analiza matematyczna w zadaniach. Cz. 2, PWN, Warszawa 2002.
3. Stewart J., Calculus : early transcendentals, Brooks/Cole Publishing Company, Pacific Grove 1991.
4. Żakowski W., Kołodziej W., *Matematyka. Cz. II*, WNT, Warszawa 1997.
5. Żakowski W., Leksiński W., *Matematyka. Cz. IV*, WNT, Warszawa 1995.

Politechnika Świętokrzyska
Kielce University of Technology

WMiBM | Wydział Mechatroniki i Budowy Maszyn