COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S1-ME-310**
	part-time programme:	
Course title in Polish	**Techniki Laserowe**	
Course title in English	**Laser Technologies**	
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 Maintenance, Laser and Nanoscale Technologies**
Course leader	**dr inż. Piotr Sęk , dr inż. Hubert Danielewski**
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 III**
	part-time programme	
Pre-requisites		
Examination required (YES/NO)		**NO**
ECTS value		**2**

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

LEARNING OUTCOMES

Category of outcome	**Outcome code**	**Course learning outcomes**	**Corresponding programme outcome code**
Knowledge	W01	Has advanced knowledge of laser devices, especially those used in material processing.	MiBM1_W02

	W02	Has advanced knowledge of available laser processing methods	MiBM1_W07 MiBM1_W17
Skills	U01	Is able to select the parameters of a simple laser processing process ditch.	MiBM1_U04
	U02	Can design a simple technological process in the area of mechanics and machine construction and select appropriate machines and devices for this purpose	MiBM1_U08
Competence	K01	Is aware of the risks associated with the use of laser techniques.	MiBM1_K01
	K02	Is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the safety of other people and the impact on the environment and the responsibilities related to these issues.	MiBM1_K02

COURSE CONTENT

Type of instruction lecture	Topics covered
lecture	Historical notes. Physical basis of laser radiation generation, construction of resonator. Properties of laser radiation. Applications of lasers in technology and in everyday life. Laser radiation sources. Laser systems for processing. Laser cavity technologies – cutting and drilling. Laser welding. Laser surface treatment Laser additive technologies
laboratory	Getting to know the laboratory. Health and safety rules. Laser cutting. Laser welding Laser hardening. Laser cladding. Laser marking.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other
W01			x			
W02			x			
U01					x	
U02			x		x	
K01						x
K02					x	x

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	non-examination assessment	Obtaining at least 50% of points in the test.
laboratory	non-examination assessment	Obtaining at least 50% of points in the test. Positive completion of course reports.

OVERALL STUDENT WORKLOAD

ECTS weighting												
No.	Activity type	Student workload										Unit
		full-time programme					part-time programme					
1.	Scheduled contact hours	L	C	Lb	P	S	L	C	Lb	P	S	h
		15		15								
2.	Other contact hours (office hours, examination)	2		2								h
3.	**Total number of contact hours**	**34**										h
4.	**Number of ECTS credits for contact hours**	**1,4**										ECTS
5.	**Number of independent study hours**	**16**										h
6.	**Number of ECTS credits for independent study hours**	**0,6**										ECTS
7.	**Number of practical hours**	**25**										h
8.	**Number of ECTS credits for practical hours**	**1**										ECTS
9.	**Total study time**	**50**										h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**2**										ECTS

READING LIST

1. Wiliam Steen, Laser Material Processing, 2003
2. Jan Kusiński, Lasery I ich zastosowania w inżynierii materiałowej, Wydawnictwo Naukowe „Akapit" Kraków 2000
3. Adam Kujawski, Paweł Szczepański, Lasery podstawy fizyczne, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1999.
4. J. M. Dowden, The Mathematical of Thermal Modeling – An Introducion to the Theory of Laser Material Processing, Chapman and Hall/CRC, London, 2001.
5. Zhu X., Naumov A.Y., Villeneuve D.M., Corkum P.B., Influence of laserparameters and material properties on micro drilling with femtosecond laser pulses, "Applied Physics A" 1999, 69: 367
6. Jacek Zimn,y Laserowa obróbka stali. Wydaw. Politechniki Częstochowskiej, 1999.
7. Jacek Zimny, Piotr Myjak, Mikrospawanie laserowe w mechatronice. Kraków : Polska Geotermalna Asocjacja [etc.], 2012.