KAUNAS UNIVERSITY OF TECHNOLOGY

STUDY MODULE PROGRAMME (SMP)

Module Code	T	150	B	209	Accredited until	2024	09	01	Renewal date		
	Branch of Science		Progr.	Registr. №.							

Entitlement

Sensors and their Technologies

Prerequisites

Basics of physics and mathematics

Main aim

To know the main types of the sensors, its operation and design principles. To obtain knowledge about the main application areas of the sensors.

Course (module) Learning Outcomes

№.	Outcomes	Teaching / Learning Methods	Assessment Methods
1	Basic knowledge about the design and operation principles of the different sensors	Lecture	Written examination
2	Know and understand operation principles, design types and application areas of the different optical sensors.	Laboratory classes, Lecture	Colloquium (interview led by lecturer and / or specialist), Laboratory examination
3	Know and understand operation principles, design types and application areas of the different temperature sensors.	Laboratory classes, Lecture	Colloquium (interview led by lecturer and / or specialist), Laboratory examination
4	Know and understand operation principles, design types and application areas of the different magnetic field sensors.	Laboratory classes, Lecture	Laboratory examination, Written examination
5	Know and understand operation principles, design types and application areas of the various chemical sensors	Laboratory classes, Lecture	Laboratory examination, Written examination
6	Know and understand operation principles, design types and application areas of the mechanical sensors	Laboratory classes, Lecture	Laboratory examination, Written examination
7	Know and understand operation principles, design types and application areas of the different micromechanical sensors.	Lecture	Written examination

Summary

In this course types of the sensors, its operation and design principles are described. Optical sensors (semiconductor photodetectors, photoemission-based sensors, coordination-sensitive detectors) are explained. Different thermo-sensors, peculiarities of the measurements of the thermal resistance, temperature measurement methods are described. Types and operation principles of the magnetic field sensors are depicted. Types and operation principles of the chemical and bio- sensors are explained. Mechanical sensors and its application for measurements of the distance, displacement, acceleration, pressure are explained. Micromechanic sensors are described in present cource as well.

Level of module

Level of programme		Subject group
Cycle	Degree	
First	Bachelor	Special Subjects

Syllabus

№.	Sections and themes
1.	Main types of the optical sensors and their operation principles
2.	Main types of desing of the temperature sensors and their operation principles
3.	Main types of desing of the magnetic sensors and their operation principles
4.	Main types of desing of the chemical sensors and their operation principles

№.	Sections and themes
5.	Main types of desing of the mechanical sensors and their operation principles
6.	Main types of desing of the micromechanical sensors and their operation principles

Evaluation procedure of knowledge and abilities:

The ten-grade scale and the cumulative evaluation system are applied. The module's final evaluation consists of the sum of multiplications of the grades of the intermediate assessments and the final assessment multiplied by weighting coefficients (percentage components).

References

№.	Title	Edition in KTU library		In KTU bookstore	Number of ex. in the methodical cabinet of the depart.
		Pressmark	Number of exemplars		
1.	The measurement, instrumentation, and sensors : handbook / editor-in-chief John G. Webster (1999)	E26673	1	No	
2.	Paskaitų konspektai			No	
3.	Du, Winncy Y. Resistive, capacitive, inductive, and magnetic sensor technologies (2015)	D213360	1	No	
4.	Smart sensors and MEMS : intelligent devices and microsystems for industrial applications (2018)	D216279	1	No	
5.	Fraden, Jacob Handbook of modern sensors : physics, designs, and applications (2016)	D216244	1	No	
6.	https://moodle.ktu.edu/course/view.php?id=1205			No	

Additional literature

№.	Title
1.	Handbook of modern sensors : physics, designs, and applications / Jacob Fraden (2010)

Lecturer

	Position	Name, surname
Coordinating	General Research Assistant	Šarūnas MEŠKINIS

Subdivision

	Entitlement	Code	Contribution, %
Atsakingas padalinys	Institute of Materials Science	70	100

Languages of instruction

Autumn semester:	Lithuanian, English

Teaching form

№.	Mode of studies	Semester		Structure					Total hours	Credits
				Lectures	Practical (supervised)	Laboratory (supervised)	Tutorial	Independent Learning		
1	Standard	A	S	32	0	32	0	96	160	6

Teaching form Standard

Schedule of individual work tasks and their influence on final grade

Assessment form	Final Assessment	№. of syllabus	Total hours	Influence on grade, %	Week of presentment of task (*) and reporting (o)															
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17-20
Laboratory examination		1-8	16	10	*															0	
Written examination	√	4-7	45	50	*																0
Colloquium (interview led by lecturer and / or specialist)		1-3	35	40										0							
Total:	-	-	96	100																	

Assessment criteria and connection to the study module's study results

Assessment form	Assessment week	Assessment criteria	Course (module) Learning Outcomes
Laboratory examination	16	• 1. Preparation for laboratory work. 2. Analysis of the obtained results and comparison with the theoretical material. 3. Formulation and justification of conclusions. 4. Presentation of the results of the graphic part. 5. Reliability of results.	• Know and understand operation principles, design types and application areas of the different magnetic field sensors. • Know and understand operation principles, design types and application areas of the different optical sensors. • Know and understand operation principles, design types and application areas of the different temperature sensors. • Know and understand operation principles, design types and application areas of the mechanical sensors • Know and understand operation principles, design types and application areas of the various chemical sensors
Written examination	17	• 1. Each exam question is evaluated in a 10-point system. If nothing is answered at all - 0. 2. The average grade of all examination questions is derived and the final examination grade is derived accordingly. 3. The exam is credited if the final grade is 5 or more.	• Basic knowledge about the design and operation principles of the different sensors • Know and understand operation principles, design types and application areas of the different magnetic field sensors. • Know and understand operation principles, design types and application areas of the different micromechanical sensors. • Know and understand operation principles, design types and application areas of the mechanical sensors • Know and understand operation principles,

Assessment form	Assessment week	Assessment criteria	Course (module) Learning Outcomes
			design types and application areas of the various chemical sensors
Colloquium (interview led by lecturer and / or specialist)	10	• 1. Each colloquium question is evaluated on a 10-point scale. If nothing is answered at all - 0. 2. The average of all grades is derived and the final colloquium grade is derived accordingly. 3. The colloquium is credited if the final grade is 5 or more.	• Know and understand operation principles, design types and application areas of the different optical sensors. • Know and understand operation principles, design types and application areas of the different temperature sensors.