# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optoelectronic [N1Eltech1>Optoel]

## Course

Field of study
Electrical Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

## Number of hours

Lecture
10

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

dr inż. Joanna Parzych
joanna.parzych@put.poznan.pl

## Lecturers

## Prerequisites

Student starting this item should have basic knowledge of semiconductors, optics, electrotechnics, electronics and metrology. Also should have ability to realize the efficient self-education in the area related to the chosen field of study and have awareness of the necessity of broadening of the competence in the field of electrical engineering and willingness to cooperate in a team.

## Course objective

Knowledge of fundamentals of optoelectronics and photonics and the selected applications of modern optoelectronic devices and equipment.

## Course-related learning outcomes

Knowledge:
Student:
- has knowledge about the importance and scope of the optoelectronics a
- has knowledge about structure and principles of optoelectronic devices
- has knowledge about generation, transmission and detection of optical signals

Skills:
Student:
- is ability to characterize the importance and scope of the optoelectronics
- is ability to plan and accomplish a simple engineering task by the use of the selected basic optoelectronic elements

Social competences:
Student is especially understanding the need of formulating and information of the relating achievements of optoelectronics and photonic engineering and bringing it clearly into general use

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
1. Lectures:
- evaluation of the knowledge with a written test related to the content of lectures (test, computational and problem questions), awarding marks in laboratory exercises)
- continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception).
2. Laboratory exercises:
- continuous estimating with the tests,
- awarding the skill increase,
- the evaluation of knowledge and skills connected with the measuring tasks and prepared reports
Getting additional points for the activity during classes, in particular:
- the efficiency of the use of acquired knowledge to solve a given problem;
- skill of the co-operation within the team practically realizing a given detailed task in the laboratory;
- remarks connected with the improvement of didactic materials;
- the aesthetic qualities of the reports

## Programme content

1. Lectures:
Theoretical questions are presented in the exact reference to the practice:
- Tendency to development in the area of optoelectronics and photonics
- Influence of optical radiation on elements of the matter
- Selected photoemitters and photodetectors: ight-emitting diodes, laser diodes, photodiodes, photocells
- Basics of laser technique
- Fibre-optic cables
- Photosensitive matrices
2. Laboratory exercises:
Implementation of work in teams and carrying out experiments including:
- Acquisition and transmission of measuring information by optical link
- Fibre-optic cables
- Optoelectronic separation of signals
- Measurement of selected photoemiters and photodetectors parameters
- Accuracy of optoelectronic measurements

## Teaching methods

1. Lectures: multimedia presentations (included schemes, photos) expanded by examples shown on a board.
2. Laboratory exercises: teamwork and performing experiments including: the connection of a measuring system, measuring the indicated quantities, preparing a report.

## Bibliography

Basic
1. A. Cysewska-Sobusiak, J. Parzych, Optoelektronika i fotonika. Zagadnienia wybrane, Wyd. Politechniki Poznańskiej, Poznań 2020
2. A. Cysewska-Sobusiak, Podstawy metrologii i inżynierii pomiarowej, Wyd. Politechniki Poznańskiej, Poznań 2010
3. Z. Bielecki, A. Rogalski, Detekcja sygnałów optycznych, WNT, Warszawa 2001

4. K. Booth, S. Hill, Optoelektronika WKŁ, Warszawa 2001
5. R. Jóźwicki Podstawy inżynierii fotonicznej, Oficyna Wyd. Politechniki Warszawskiej, Warszawa 2006
6. Z. Kaczmarek - Światłowodowe czujniki i przetworniki pomiarowe, Agenda Wydawnicza PAK, Warszawa 2006
7. Parzych J., Pomiarowy model detekcji promieniowania w układzie dioda LED - przetwornik CCD, Przegląd Elektrotechniczny, nr 6, 2016, s. 176-179
8. Szlaferek M., Parzych J., Układy chłodzenia diod i matryc LED, Poznan University of Technology Academic Journals, Electrical Engineering No 88, Computer Applications in Electrical Engineering 2016, Poznan 2016, s. 273-287
9. Parzych J., Hulewicz A., Krawiecki Z., Matryce światłoczułe - właściwości, parametry, zastosowania, Poznan University of Technology Academic Journals, Electrical Engineering, No 92, Poznań 2017, s. 189-204

Additional
1. A. Cysewska-Sobusiak - Modelowanie i pomiary sygnałów biooptycznych, Wyd. Politechniki Poznańskiej, Poznań 2001
2. R. Jóźwicki - Technika laserowa i jej zastosowania, Oficyna Wyd. Politechniki Warszawskiej, Warszawa 2009
3. J. Siudak - Wstęp do współczesnej telekomunikacji światłowodowej, WKŁ, Warszawa 1999
4. A. Szwedowski, R. Romaniuk - Szkło optyczne i fotoniczne, WNT, Warszawa 2009
5. W. Żagan - Podstawy techniki świetlnej, Oficyna Wyd. Politechniki Warszawskiej, Warszawa 2007
6. www.bipm.org
7. www.gum.gov.pl

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 55 | 2,00 |
| Classes requiring direct contact with the teacher | 25 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30 | 1,00 |