



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of surveying

### Course

Field of study

Environmental engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1 / 2

Profile of study

general academic

Course offered in

polish

Requirements

### Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Ireneusz Wyczalek, PhD hab., prof. PP

Responsible for the course/lecturer:

email: Ireneusz.Wyczalek@put.poznan.pl

tel. +48 61 6652420

### Prerequisites

Basic knowledge of analytical geometry, trigonometry and differential calculus.

Ability to perform calculations using trigonometric functions, with the use of calculator and a computer.

Diligence, awareness of the need to update and supplement knowledge and skills.

### Course objective

The aim of the classes is to familiarize students with large-scale geodetic and cartographic elaborations, and other sources of spatial data, developing the ability to use these data, as well as with basic geodetic works used in construction, as well as the interpretation and development of measurement data.

### Course-related learning outcomes

Knowledge

1. Basic features of large-scale maps and spatial information systems based on a large-scale map, []



2. Basic methods of geodetic surveying and the equipment used for these measurements, as well as methods of mathematical development of observations, especially in engineering applications, []
3. The specificity of geographic information systems (GIS), data used for spatial analyzes and the ways of using these data with the use of tools included in the system. []
4. The specificity of engineering surveying in the field of construction service, as-built inventory and diagnostic measurements of engineering facilities. []

#### Skills

1. The ability to read a map or a set of spatial data and use the obtained information for the purpose of performing spatial analyzes. []
2. Ability to operate geodetic equipment and perform measurements in accordance with the principles adopted in geodesy, []
3. The use of measurement data to calculate the geometric quantities describing the measured object and the calculation of the quantities used to bring the project into the field, []

#### Social competences

1. Ability to interpret available cartographic materials in undertaken engineering tasks []
2. Awareness of the need to perform measurements and calculations as a team and to solve geometric problems in field conditions []
3. Understanding the need to deepen your knowledge and develop skills in the field of description of space []

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

##### LECTURES:

Problem test on the use of plane surveying methods or cartographic materials for the needs of engineering tasks 1 hour after the 5th lecture (max. 2 points out of 5),

Test on the knowledge of vertical and GNSS measurements, the measurement methods used and the forms of presentation of measurement results - map, other forms of presentation (max. 2 points out of 5),

Test in the field of engineering applications of geodesy and cartography (max. 1 point out of 5)

##### Laboratories and summer internships:

Active presence during laboratory classes (max. 2 points out of 15)

Performing individual measurement tasks successively as part of laboratory exercises (8 points),



Performing and developing measurements to update the "basic map", as well as cross-sections through the terrain and 3D terrain models (5 points).

Grading scale (for laboratory and field exercises):

Score = total points (15) divided by 3 (and rounded to 0.5 points)

### Programme content

Spatial information in engineering practice. Geodetic space, coordinate systems, classification of geodetic measurements. Map as a source of spatial information. Classification of maps according to the criterion of content and the scale of map. Methodology of cartographic presentation. Spatial information systems. Photogrammetric methods in obtaining and processing information about the space. Aerial and satellite images for measurement and photo-interpretation purposes. Photomaps, orthophotomaps, line and thematic maps.

Methods of plane and height measurements. Operations with geodetic instruments. Interpretation, accuracy assessment and processing of measurement data. Geodetic techniques of satellite navigation and laser scanning.

National geodetic and cartographic resources. District centers of geodetic and cartographic documentation. Basic map. Elements of land and building records, land and mortgage registers, local spatial development plan. Geodetic record of utilities networks. Project documentation reconciliation teams. Geodetic implementation measurements: implementation control networks, staking out and construction service, as-built and control measurements.

DESIGN EXERCISE: Using the basic map in engineering problems

### LABORATORY TOPICS

- 1) Measurements of horizontal angles
- 2) Measurements of length and horizontal details
- 3) Coordinate geometry (COGO)
- 4) Measurements and calculations of heights
- 5) Tacheometry, GNSS

### Teaching methods

Lecture with PPT presentation (or film), direct work with measuring instruments; calculations and map updating with numerical methods.

### Bibliography



Basic

1. Pomiary sytuacyjne w zastosowaniach inżynierskich. Wyczałek I., Mróczyńska M., Plichta A., Wyd. PP, 2019
2. Mapa w zastosowaniach inżynierskich. Wyczałek I., Plichta A., Wyd. PP, 2020
3. Geodezja dla inżynierii środowiska. Przewłocki S., Wyd. PWN, 1998

Additional

1. Jagielski A., Geodezja I w teorii i praktyce część 1i 2, Wyd. GEODPIS, 2010
2. Wolski B., Toś C., Geodezja inżynieryjno-budowlana. Wydawnictwa Politechniki Krakowskiej 2005.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory reports, preparation for tests/exam, report preparation of sommer practice works) <sup>1</sup>	15	0,5

<sup>1</sup> delete or add other activities as appropriate