**Nazwa przedmiotu:**

Descriptive Geometry I

**Koordynator przedmiotu:**

dr Cecylia Łapińska, dr hab. inż. Grzegorz Dzierżanowski

**Status przedmiotu:**

Obowiązkowy

**Poziom kształcenia:**

Studia I stopnia

**Program:**

Civil Engineering

**Grupa przedmiotów:**

Obligatory

**Kod przedmiotu:**

1080-BU000-ISA-0301

**Semestr nominalny:**

1 / rok ak. 2021/2022

**Liczba punktów ECTS:**

3

**Liczba godzin pracy studenta związanych z osiągnięciem efektów uczenia się:**

Calculating points ECTS:
lectures - 15h,
tutorials - 15h,
preparation for class work - 10h,
execution of 10 drawings (exercises) - 15h,
reading profesional literature - 10h,
preparation for 3 written tests - 10h.
Total - 75h i.e. 3 ECTS

**Liczba punktów ECTS na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich:**

Courses requiring direct participation of teacher:
lectures - 15h,
work shops - 15h,
consultations for projects (exercises) - 15h.
Total - 45h i.e. 2 ECTS.

**Język prowadzenia zajęć:**

angielski

**Liczba punktów ECTS, którą student uzyskuje w ramach zajęć o charakterze praktycznym:**

Tutorials - 15h,
preparation for class work - 10h,
execution of 10 drawings (exercises) - 15h
Total - 40h i.e. 1.5 ECTS

**Formy zajęć i ich wymiar w semestrze:**

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| --- | --- |
| Wykład: | 15h |
| Ćwiczenia: | 0h |
| Laboratorium: | 0h |
| Projekt: | 15h |
| Lekcje komputerowe: | 0h |

**Wymagania wstępne:**

Minimal preparation in geometry: Basic knowledge of plane geometry (secondary school program of mathematics): properties of triangles; regular polygons; parallelism and perpendicularity; constructions (by using a ruler and compasses) involving straight lines and circles, particularly tangents to circles. Elementary knowledge of 3D-space geometry (secondary school program of mathematics): straight lines, planes and relationships; dihedral angles; distances; parallelism and perpendicularity in the space; solids; regular polyhedrons, etc.

**Limit liczby studentów:**

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**Cel przedmiotu:**

Mathematical approach to engineering graphics. Introductory course in engineering geometry: a review of principal geometric methods to give an one-to-one representation of 3D-space on a plane. Aims of the subject are pedagogical, mathematical and practical. Pedagogical: To introduce the student to ideas and ways of thinking, without use of numbers, which generally are new to him, and thus to form and develop his 3D-space imagination, as well as the ability of logical thinking and coming to right conclusions concerning 3D-space systems. Mathematical: To give rudiments of projective geometry. To study fundamental properties of central projection (perspective). To study the principle and properties of parallel projection: axonometric and orthogonal projections (Monge's projections). Practical: To give a working knowledge of the engineer's language: how to make and how to read drawings. To become familiar with presented methods and acquire the ability to specify their use with assurance, particularly: to make pictorial drawings (freehand or with instruments) of polyhedrons or surfaces of revolution with cut-out by using the principle of vertical perspective or axonometry, to represent objects by drawing their orthogonal projections and to use principal constructions of this method to find the true shape and size of objects represented by their orthographic views as well. To apply obtained skills to solve some problems concerning certain roofs.

**Treści kształcenia:**

Ideal elements and projective space. Central projection: the principle of the one-to-one transformation and basic constructions; image of points, straight lines and planes; restitution; ground plane - relationships between plan and perspective of this plane. Vertical perspective of a polyhedron with sections by frontal, horizontal or vertical planes. Vertical perspective of a set of rectangular prisms if a plan and heights are given. Parallel projection: invariants; oblique axonometric projection. The most often used axonometric systems. Representation of polyhedrons and surfaces of revolution with removed parts. Associate axonometric systems applied for drawing joints of wooden pieces. Orthogonal projection as a particular case of parallel projection. Characteristic invariant of this projection. Reversibility of the transformation and Monge's projections. Construction of common elements. Intersection of polygons and polyhedrons. Three projections of a prism or pyramid with removed parts. Transformation of the projection planes system; auxiliary projection planes. Application of the transformation to find dihedral angles, perpendiculars to a plane, distances, projections of polyhedron sections and their true shape and size as well. Revolutions and rabatments; application to obtain the normal view of a plane. Complete geometric design of roofs satisfying certain conditions.

**Metody oceny:**

Attendace at classes - 10 points. Tutorial: two written tests and ten projects - (2x30 + 10x2) points. Lectures: one written test - 10 points.

**Egzamin:**

nie

**Literatura:**

[1] Łapińska C.: Descriptive Geometry, Oficyna Wydawnicza PW. Warszawa 2016
[2] Bieliński A.: Geometria wykreślna, Oficyna Wydawnicza PW, Warszawa 2015.
[3] French Th. E.: Graphic Science and Design, Mc GRAW-HILL Book Company, Inc.
[4] French Th. E., Vierck Ch. J.: Graphic Science, Mc GRAW-HILL Book Company, Inc.
[5] Przewłocki S.: Geometria wykreślna w budownictwie, Arkady Warszawa 1997.
[6] Ryan D. L.: CAD/CAE Descriptive Geometry, CRC Press, Inc.
[7] Standiford K., Standiford D.: Descriptive Geometry An Integrated Approach Using AutoCAD.
[8] Woolf S.: An Elementary Course in Descriptive Geometry, Barnes & Noble.
[9] C. Łapińska: Descriptive Geometry I - Lectures & Exercises, script available for students in electronic form on PELE.

**Witryna www przedmiotu:**

www.sc.is.pw.edu.pl

**Uwagi:**

## Charakterystyki przedmiotowe

### Profil ogólnoakademicki - wiedza

**Charakterystyka W1:**

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Weryfikacja:

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**Powiązane charakterystyki kierunkowe:** K1\_W01, K1\_W02

**Powiązane charakterystyki obszarowe:** I.P6S\_WG.o, P6U\_W

**Charakterystyka W2:**

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Weryfikacja:

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**Powiązane charakterystyki kierunkowe:** K1\_W01, K1\_W02

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WG.o

### Profil ogólnoakademicki - umiejętności

**Charakterystyka U1:**

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Weryfikacja:

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**Powiązane charakterystyki kierunkowe:** K1\_U09

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UW.o, III.P6S\_UW.o

**Charakterystyka U2:**

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Weryfikacja:

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**Powiązane charakterystyki kierunkowe:** K1\_U09

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UW.o, III.P6S\_UW.o

### Profil ogólnoakademicki - kompetencje społeczne

**Charakterystyka K1:**

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Weryfikacja:

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**Powiązane charakterystyki kierunkowe:** K1\_K01

**Powiązane charakterystyki obszarowe:** P6U\_K, I.P6S\_KR

**Charakterystyka K2:**

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Weryfikacja:

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**Powiązane charakterystyki kierunkowe:** K1\_K01

**Powiązane charakterystyki obszarowe:** P6U\_K, I.P6S\_KR