COURSE DESCRIPTION CARD - SYLLABUS

Course name
Engineering graphics and CAD [S1Bud1>GICAD2]

Course

Field of study
Civil Engineering

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
0

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Prerequisites

KNOWLEDGE: Basic knowledge of geometry and descriptive geometry. SKILLS: The ability to obtain information from the indicated sources. SOCIAL COMPETENCES: Awareness of the need to acquire and

expand knowledge. Willingness to cooperate in a team.

Course objective

To familiarize students with the elements of computer graphics in a two-dimensional approach (projections and sections). To acquaint students with the basics of creating construction and building documentation based on three-dimensional geometry supplemented with information about the represented object.

Course-related learning outcomes

Knowledge:
They know the rules of technical drawing for creating and reading architectural and construction drawings.

Skills:
They can read architectural and construction drawings and prepare graphic documentation with the use of applicable markings and dimensions.
Uses information technologies, Internet resources and other sources to obtain information; is able to integrate and interpret the obtained information.

Social competences:
They are able to define priorities in the implementation of tasks set by himself and others.
They are responsible for the reliability of the obtained results and for their interpretation.
They are aware of the need to improve professional and personal competences.
They are ready to critically evaluate his knowledge and received content, as well as to critically evaluate the results of his own work.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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LABORATORY:
Assessment is based on the assessment of independent work in the AutoCad / Revit environment. The student"s task is to draw up a few simple drawings and one plan of a single-family house.
Drawings are assessed in context of:
• completeness,
• correct application of the standard rules of technical drawing,
• appropriate selection and use of CAD environment tools (including layers, blocks, etc.),
• correct presentation of structural and architectural elements,
• legibility, consistency and aesthetics.
The knowledge and the ability to use in practice the tools presented during the course are also assessed.
The total number of points for the drawings is 10.
The student is obliged to deliver all the drawings by the date indicated by the teacher, but not later than three days before the last class.
The theoretical knowledge and acquired skills are verified by a test that takes place during the last class.
The date may be changed by the teacher.
The number of points for the test is 5.
The final grade is issued on the basis of the points obtained together with the assessed drawings and a test according to the following point thresholds : 100%-91% - 5,0; 90%-81% - 4,5; 80%-71% - 4,0; 70%-61% - 3,5; 60%-51% - 3,0.

Programme content

LABORATORY:
Students work in a computer laboratory using CAD software (eg AutoCad, Revit). The following issues are discussed and practiced:
1. 2D
1.1. Create basic objects: line, polyline, point, circle, ring, arc, area, ellipse, rectangle, polygon.
1.2. Object Editing: Modify toolbar - erase, copy, mirror, offset, array, move, rotate, scale, trim, extend.
1.3. Dimensioning: dimension tools - linear, normal, coordinates, radius, diameter, angular, reference line, center mark, base, serial.

1.4. Layers: hide, lock in viewports, lock, color, linetype, lineweight.
1.5. Object snap modes: end, symmetry, center, point, quadrant, intersection, extension, perpendicular, tangent, near, apparent, parallel.
1.6. Text input.
1.7. Hatch: selection of hatch area and pattern, hatch preview, scale.
2. 3D
2.1. Project organization: buildings, levels, ...
2.2. Working planes,
2.3. Creating and editing basic objects: walls, windows ...
2.4. Generating project documentation.

Course topics

1. 2D CAD

Creating Basic Objects
Line: Create straight lines, defining start and end points.
Polyline: Draw connected lines that create polygons or complex shapes.
Point: Establishing single points in the workspace.
Circle: Draw circles by defining the center and radius.
Arc: Draw arcs by specifying three points on a circle.
Ellipse: Draw ellipses by defining the major and minor axes.
Rectangle: Draw rectangles by specifying two opposite corners.
Polygon: Create regular polygons by specifying the number of sides and radius of an inscribed or circumscribed circle.

Editing Objects
Erase: Delete selected objects from the drawing.
Copy: Create a copy of selected objects at a specified distance.
Mirror: Create mirror images of objects along a selected axis.
Offset: Create parallel lines at a specified distance from existing lines.
Array: Create regular arrangements of objects in a grid or circle.
Move: Move objects to a new location in the drawing.
Rotate: Rotate objects around a selected point by a specified angle.
Scale: Change the size of objects by a specified factor.
Trim: Shorten objects based on specified boundaries.
Extend: Extend objects to their specified limits.

Dimensioning
Linear: Measures the distance between two points.
Normal: Measures the distance at right angles to the selected line.
Coordinates: Dimensioning in the coordinate system.
Radius: Measurement of the radius of a circle or arc.
Diameter: Measurement of the diameter of a circle.
Angular: Measures the angle between two lines.
Leader: Adding Guides .
Center Mark: Mark the center of a circle or arc.
Baseline: Create a series of dimensions from a common baseline.
Serial: Creating sequential dimensions.

Layers
Hide: Temporarily turn off the visibility of selected layers.
Viewport Locking: Prevent objects from being edited on specific layers.
Close: Turn off layers completely.
Color: Assign colors to different layers.
Line type: Set the line style (solid, dashed, dotted).
Line Width: Set the line thickness.

Object Location Modes
End: Snapping to the end points of objects.

Symmetry: Snapping to the centers of symmetry lines.
Center: Snapping to the centers of circles and arcs.
Point: Snapping to defining points.
Quadrant: Snapping to points in quadrants of circles.
Intersection: Snaps to the intersection of two lines.
Extension: Snap to the extension line.
Perpendicular: Snaps perpendicular to the line.
Tangent: Snap tangentially to circles.
Near: Snap to the closest points on objects.
Apparent: Snapping to virtual points.
Parallel: Snaps parallel to the line.

Entering Text
Adding and editing text, setting fonts, size and style.

Hatching
Area and Hatch Pattern Selection: Define areas to fill with hatch patterns.
Hatch Preview: Visualize the pattern before applying it.
Scale: Adjusts the scale of the hatch pattern.

2. 3D CAD

Project Organization
Buildings: Defining the structure of an architectural project.
Levels: Establishing different storey levels and organizing them in the project.

Work Planes
Establishing and managing the planes on which objects are drawn.

Creating and Editing Basic Objects
Walls: Draw and modify building walls.
Windows: Adding and editing windows in the project.

Generating Design Documentation
Creating technical documentation, drawings and diagrams based on a 3D model.

During classes, students will work in a computer laboratory where they will practice the above issues using CAD software. Participants will have the opportunity to practically apply their skills in creating and editing 2D and 3D projects, as well as generating professional technical documentation.

Teaching methods

Exercise method
Demonstration method
Design method

Bibliography

Basic
1. PN-ISO 6707-1:2008 Budownictwo. Terminologia. Terminy ogólne
2. PN-EN ISO 5457:2002 Dokumentacja techniczna wyrobu. Wymiary i układ arkuszy rysunkowych
3. PN-EN ISO 128-23;2002 Rysunek techniczny. Ogólne zasady przedstawiania. Część 23: Linie na rysunkach budowlanych
4. PN-EN ISO 3098-0:2002 Dokumentacja techniczna wyrobu. Pismo. Część 0: Zasady ogólne
5. PN-B01030:2000 Rysunek budowlany. Oznaczenia graficzne materiałów budowlanych
6. PN-B-01025:2004 Rysunek budowlany. Oznaczenia graficzne na rysunkach architektonicznobudowlanych
7. PN-ISO 7518:1998 Rysunek techniczny. Rysunki budowlane. Uproszczone przedstawianie rozbiórki i przebudowy
8. PN-B-01029:2000 Rysunek budowlany. Zasady wymiarowania na rysunkach

architektonicznobudowlanych
9. PN-ISO 129:1996 Rysunek techniczny. Wymiarowanie. Zasady ogólne. Definicje. Metody wykonania i oznaczenia specjalne.
10. Rysunek techniczny budowlany - E. Miśniakiewicz, W. Skowroński, Warszawa, Arkady 200711.
Rysunek techniczny w budownictwie - J. Bieniasz, B.Januszewski, M.Piekarski, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2009

Additional
1. PN-EN ISO 5455:1998 Rysunek techniczny. Podziałki
2. PN-ISO 128-30:2006 Rysunek techniczny. Zasady ogólne przedstawiania. Część 30: Wymagania podstawowe dotyczące rzutów
3. PN-EN ISO 5456-1,2,3:2002 Rysunek techniczny. Metody rzutowania

Breakdown of average student's workload

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