



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Engineering graphics and CAD [S1BZ1E>GICAD]

### Course

Field of study

Sustainable Building Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

English

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

0

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

30

### Number of credit points

4,00

### Coordinators

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### Lecturers

dr inż. Hasan Al-Rifaie

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### Prerequisites

1 Knowledge: Fundamentals of geometry and descriptive geometry. 2 Skills: Ability to gain information from recommended sources. 3 Social competencies: Understanding the necessity of constant actualisation and complementation of knowledge. Readiness to undertake co-operation within a team.

### Course objective

Obtaining the ability to execute architectural and building drawings as well as the ability to read information from archival drawings.

### Course-related learning outcomes

Knowledge:

have advanced knowledge of the principles of descriptive geometry and technical drawing, recording and reading architectural drawings, construction maps and geodesic maps, as well as the methods of preparing the maps both traditionally and using the BIM technology (Building Information Modelling) - [W01\_KSB\_W02]

Skills:

are equipped with various skills necessary for performing design tasks in the form of particular works in the field of sustainable building engineering, including such skills as: traditional techniques (freehand drawing), specialized software dedicated for design (CAD and BIM technology) - [U01 KSB\_U27]

Social competences:

take responsibility for the accuracy and reliability of working results and their interpretation - [K01\_KSB\_K02]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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- Evaluation of lectures Not applicable
- Exercise evaluation Not applicable
- Evaluation of projects

As part of the projects, the student performs construction and building drawings of a detached house (horizontal and vertical projection). Drawings are evaluated in the context of:

- correctness of using the standard principles of technical drawing,
- proper selection and use of the CAD environment tool (including layers, blocks, etc.),
- proper presentation of structural and architectural elements,
- readability, consistency and aesthetics.

The credit is obtained from a minimum of 50% of the maximum number of points. Evaluation criteria: 100% -91% -5.0; 90% -81% -4.5; 80% -71% -4.0; 70% -61% -3.5; 60% -51% -3.0; less than 50% -2.0

- Laboratory assessment

Completing the laboratory is based on the evaluation of independent work in the AutoCad / QCad environment. The student has the task of making a few simple drawings. The knowledge and ability to apply the tools presented during the course is assessed.

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### Programme content

Laboratory:

Lab.1. Computer Aided Drafting

Lab.2. Cad Software

Lab.3. Learning AutoCad (2D)

Lab.4. Engineering Drawing Exercises

Lab.5. Drawing instruments and materials.

Lab.6. Drawing papers and sheet sizes.

Lab.7. Lettering.

Lab.8. Line work - line type, thickness

Lab.9. Dimensioning.

Lab.10. Drawing scales.

Lab.11. Graphical symbols of building materials.

Lab.12. Definition of basic structural components of building.

Lab.13. Graphical symbols used in architectural and construction drawings

Lab.14. Drawing types included in building design documents

Lab.15. Final Exam

Project:

Week 1: Demonstration of the Project Idea and required drawings

Week 2-13: Engineering Drawings are drawn by the student with consistent supervision of the teacher

Week 14: Final Consultations

Week 15: Project Submission and Assessment

### Course topics

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.

Project:

Defining the structure of an architectural project.

Establishing different storey levels and organizing them in the project.

Generating Design Documentation for all floors, elevations and sections.

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 projects, as well as generating professional technical documentation.

## Teaching methods

Laboratory: Multimedia presentation, illustrated with examples given on a board, and performance of tasks given by the teacher

Project: An independent project idea will be given to the student to accomplish throughout the semester, with the possibility to consult the teacher in any step of the project.

## Bibliography

Basic

1. ISO 6707-1:2004 Building and civil engineering -- Vocabulary -- Part 1: General terms
2. EN ISO 5457:1999 Technical product documentation ? Sizes and layout of drawing sheets
3. EN ISO 128-23:1999 Technical drawings ? General principles of presentation ? Part 23: Lines on construction drawings
4. EN ISO 3098-0:1997 Technical product documentation -- Lettering -- Part 0: General requirements
5. PN-B01030:2000 Rysunek budowlany. Oznaczenia graficzne materiałów budowlanych
6. PN-B-01025:2004 Rysunek budowlany. Oznaczenia graficzne na rysunkach architektoniczno-budowlanych
7. ISO 7518:1983 Technical drawings -- Construction drawings -- Simplified representation of demolition and rebuilding
8. PN-B-01029:2000 Rysunek budowlany. Zasady wymiarowania na rysunkach architektoniczno-budowlanych
9. ISO 129:2018 Technical product documentation (TPD) ? Presentation of dimensions and tolerances ? Part 1: General principles
10. Rysunek techniczny budowlany - E. Miśniakiewicz, W. Skowroński, Warszawa, Arkady 2007
11. Rysunek techniczny w budownictwie - J. Bieniasz, B. Januszewski, M. Piekarski, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2009
12. PN-B-01040:1994 Rysunek konstrukcyjny budowlany. Zasady ogólne
13. PN-B-01042:1999 Rysunek konstrukcyjny budowlany. Konstrukcje drewniane.
14. EN ISO 3766:2003 Construction drawings -- Simplified representation of concrete reinforcement
15. ISO 4066:1994 Construction drawings -- Bar scheduling
16. EN ISO 5261:1995 Technical drawings -- Simplified representation of bars and profile sections
17. PN-ISO 2552:1997 Rysunek techniczny. Połączenia spawane, zgrzewane i lutowane. Umowne przedstawianie na rysunkach.
18. PN-B-01027:2002 Rysunek budowlany. Oznaczenia graficzne stosowane w projektach zagospodarowania działki i terenu
19. PN-B-01029:2000 Rysunek budowlany. Zasady wymiarowania na rysunkach architektoniczno-budowlanych
20. Rysunek techniczny budowlany. E. Miśniakiewicz, W. Skowroński, Arkady, Warszawa 2007
21. Rysunek techniczny w budownictwie. J. Bieniasz, B. Januszewski, M. Piekarski, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2009

Additional

1. EN ISO 5455:1979 Technical drawings -- Scales
2. PN-ISO 128-30:2006 Rysunek techniczny. Zasady ogólne przedstawiania. Część 30: Wymagania podstawowe dotyczące rzutów
3. EN ISO 5456-1,2,3:2002 Technical drawings ? Projection methods
4. PN-ISO 128-30:2006 Rysunek techniczny. Zasady ogólne przedstawiania. Część 30: Wymagania podstawowe dotyczące rzutów

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00