# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Designing a Sustainable Industry [S2Arch2>PZP]

## Course

Field of study
Architecture

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

## Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
60

## Number of credit points

6,00

## Coordinators

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## Lecturers

## Prerequisites

- the student has an ordered, theoretically founded detailed knowledge covering key issues in the field of designing the architecture of workplaces - the student has detailed knowledge of development trends in the field of designing architecture of workplaces - the student has detailed knowledge necessary to understand the social, economic, legal and non- technical conditions of designing the architecture of workplaces - the student is able to obtain information from literature, databases and other, properly selected sources, also in English, can integrate information, interpret it, as well as draw conclusions and formulate and justify opinions - the student is able to make a critical analysis of the way of functioning and evaluate the existing solutions, systems and processes - is able to communicate using various techniques in the professional environment and in other environments - the student understands the need for lifelong learning, can inspire and organize the learning process of other people - the student is aware and understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made - is able to interact and work in a group, taking various roles in it - is aware of the social role of a technical university graduate, and especially understands the need to formulate and convey to the society, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering activities; makes efforts to provide such information and opinions in a generally comprehensible manner.

## Course objective

1. Acquiring skills in the design of complex architectural structures. 2. Gaining experience in the issues of architectural design of workplaces supported by appropriate theoretical knowledge. 3. Understanding modern methods of searching for innovative design solutions with the use of conceptual modeling, CAAD, analysis of functional connections. 4. Acquiring the ability to design workplaces, hygienic, sanitary, and gastronomic facilities in the workplace buildings, supported by appropriate theoretical knowledge, 5. Familiarization with issues related to land development around public and industrial facilities,taking into account issues related to the necessary infrastructure, 6. Familiarization with issues related to architectural and urban aspects that affect the quality of life in cities, taking into account the requirements of sustainable development and climate protection (water, renewable energy).

## Course-related learning outcomes

Knowledge:
knows and understands the principles of architectural design of facilities with complex functions in a complex context, in particular: industrial facilities and their complexes of various scales and complexity in an open landscape or suburban environment;
knows and understands advanced analysis methods, tools, techniques and materials necessary to prepare design concepts for industrial facilities in an interdisciplinary environment, with particular emphasis on inter-branch cooperation;

Skills:
can design a complex architectural object with an industrial function, creating and transforming the space so as to give it new value - in accordance with the set or adopted program, taking into account the requirements and needs of all users, spatial, landscape and cultural context, technical and non-technical aspects;
can formulate a critical analysis of the conditions, including the valorization of the land development and building conditions formulate conclusions for design and spatial planning, forecast the processes of transformations in the settlement structure, and predict social effects of these transformations
can evaluate the usefulness of advanced methods and tools for solving complex engineering tasks, typical for industrial architecture, and select and apply appropriate methods and tools in design;
can think creatively and act, taking into account the complex and multi-faceted conditions of design activity, as well as expressing own artistic concepts in architectural design, particularly industrial buildings;
can integrate information obtained from various sources, formulate their interpretation and critical, detailed analysis and draw conclusions from them, as well as formulate and justify opinions and demonstrate their relationship with the design process, based on the state of knowledge in the discipline;
can communicate with the use of various techniques and tools in a professional and interdisciplinary environment in the scope appropriate for industrial architecture;
can work individually and in a team, including with specialists from other industries, and take a leading role in such teams;
can estimate the time needed to complete a complex project task;
can prepare architectural and construction documentation in appropriate scales in relation to the conceptual architectural design especially the industrial building;
can implement the principles and guidelines of universal design in industrial architecture, urban planning and spatial planning.

Social competences:
is capable to effectively use imagination, intuition, creative attitude and independent thinking in order to solve complex design problems relating especially to industrial architecture;
is capable to speak and presentat publicly;
is capable to take the role of a coordinator of activities in the project process, manage work in a team and use interpersonal skills (resolving conflicts, negotiating skills, delegating tasks), comply with the rules of working in a team and take responsibility for joint tasks and projects;

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Obtaining a positive grade for the module depends on the student achieving all the learning outcomes

listed in the syllabus.
Lectures passing conditions:
Formative assessment:
• Active participation in lectures, engaging in discussions on topics covered during lectures. Active participation in lectures may be the basis for raising the summative grade for the subject.
Summative assessment:
• Final test. Two credit terms are provided, with the second term being a correction term. A passing grade (3.0) is obtained after exceeding 50% of correct answers. The result in points converted to a percentage scale corresponds to the following grades:
0-50% = 2.0
51-60% = 3.0
61-70% = 3.5
71-80% = 4.0
81-90% = 4.5
91-100% = 5.0
Grading scale: 2.0; 3.0; 3.5; 4.0; 4.5; 5.0.
Design studio passing conditions:
- Participation in classes. The lack of active presence in more than 1/3 of the classes makes it impossible to complete the course (even in the case of submitting a term paper). This requirement is related to the inability to systematically control the student's independent execution of the project in the event of absence from the classes.
- Submission of complete project by the given deadline.
Formative assessment:
- Systematic and timely study. Implementation of applicable design tasks.
- Attention is paid to the effective use of the hours of project exercises provided for in the program for the actual work on the project during classes in the university classroom, under the supervision of designated tutors.
- Evaluation of student's participation in discussions on the group forum
Assessment scale: 2.0, 3.0; 3.5; 4.0; 4.5; 5.0
Passing threshold (3.0): minimum attendance at classes (70%), individual work on a project during classes, completion of mandatory partial tasks, systematic work during and outside classes.
The highest mark (5.0): active participation in 85% of classes, cooperation with the group, speaking up during discussions, friendly attitude towards other class participants; individual and group work on the project during classes, systematic work during and outside classes, completion of mandatory partial tasks at a very good level.
Summative assessment:
- Evaluation of the project containing the required (and complete) scope of work
- The assessment takes into account the grades forming from partial credits
Evaluation criteria of the submission work (project):
- Methodological correctness of pre-design analyses and correctness of conclusions drawn;
- Application of regulations resulting from the Construction Law and relevant regulations and standards;
- Correctness of the land development project and application of regulations concerning fire roads;
- Application of health and safety regulations;
- Assessment of adopted formal solutions;
- Assessment of applied functional solutions;
- Assessment of applied solutions in the field of construction, installations and building materials;
- Assessment of applied solutions taking into account the requirements of sustainable development and climate protection (water, renewable energy), greenery design and biologically active surfaces;
- Graphic presentation/boards - application of the principles of professional presentation of architectural and urban concepts, readability and composition of design boards;
- Substantive quality of technical drawings, architectural detail - application of principles and standards applicable during the preparation of technical drawings: dimensioning, graphic markings, descriptions.
Assessment scale: 2,0; 3.0; 3.5; 4.0; 4.5; 5.0
Negative grade (2.0): despite attendance at classes (70%), the project is incomplete (does not contain all the required drawings).
Passing threshold (3.0): the project contains a complete set of drawings indicated in the scope of the study. Fulfillment of all assessment criteria to a sufficient extent.
The highest grade (5.0): the project contains a complete set of drawings indicated in the scope of the study and additional elements agreed with the supervisor. Fulfillment of all assessment criteria in the very good scope, i.e.: pre-design analyses are exhaustive, carefully developed, and the conclusions

drawn are correct; the application of the provisions resulting from the Building Law and relevant regulations does not raise any major objections; the site management plan is in accordance with the regulations; the application of health and safety regulations does not raise any objections; the adopted formal solutions are a new value in the landscape, the form is distinguished by its aesthetics; the functional solutions are correct, take into account the ergonomics of work at various workplaces and elements of universal design; the concept of the bearing structure does not raise any objections and is clearly visible in the drawings; external materials are shown in a way that reflects their actual quality; the project takes into account the use of renewable energy sources and the management of rainwater; the graphic presentation is aesthetically above-average (at a competition level); technical drawings are in accordance with the drawing standard and contain the necessary elements (e.g. dimensioning).

## Programme content

LECTURES: The lecture series provides substantive support for the design of architectural objects with complex, specialized functions, such as factories. The issues discussed include functional, structural, technical, economic, and pro-ecological issues, as well as elements of universal design. The thematic scope refers not only to practical aspects of design but also emphasizes the implementation of sustainable development goals.
DESIGNS TUDIO: Design exercises entail the development of an architectural and spatial concept for an industrial plant that adheres to sustainable development principles. The plant should incorporate the following functional zones: production, administration, social (sanitary facilities, changing rooms, etc. - OHS), catering, and storage.
The educational objectives are to acquire: proficiency in designing complex architectural structures; expertise and knowledge in the architectural design of workplaces; competence in designing work premises, including office, hygiene-sanitary and catering rooms (OHS); skills in designing manoeuvring zones around an industrial facility; and expertise and knowledge in the application of fire protection regulations.

## Course topics

LECTURES:
- Transport issues and infrastructure on the plot
- Construction systems in industrial architecture
- Renewable energy in industrial architecture
- Application of BIM in industrial architecture
- Industrial architecture and industrial tourism
- Social facilities in the 21st century - recreational spaces for factory employees
- Influence of the Fourth Industrial Revolution on factory architecture

DESIGN STUDIO:
Eligibility - The student has the opportunity to choose the project topic (in line with the general profile of the subject), with the consent of the instructor, the student can also change the project group.
Topic: Development of a conceptual design of an industrial plant that meets the requirements of sustainable development (location and scale of the plant, water management, use of renewable energy sources, construction materials and techniques).
Design classes are divided into four key stages of implementation:
Stage I. Analysis:
A 3-week study phase of a design task, enabling the commencement of conceptual work. Includes:
• analysis and discussion about the topic.
• choice of technology (industry branch). Preliminary calculation of the space requirement based on the functional and operational program and the adopted number of employees.
• studies of functions, preparation of functional and technological connection diagrams (variants). Estimation of the area and shape of the plot needed, taking into account the reserve of land for future expansion.
• plot selection and analyses related to location (e.g., of the environment, greenery, communication, sun).
• preliminary sketches of land development variants (1: 500).
• initial concepts of the architectural form made in the form of simple working models (eg cardboard, polystyrene). During the exercises, the student should have tools (scissors, glue, adhesive tape) to work with the model in the classroom.
Stage II. Concept:

A 2-week stage of creative work on the design concept, establishing the architectural and urban vision of the industry plant. The architectural and urban concept of the facility on the selected plot includes:
• preliminary development of 3 different variants of spatial development with the use of working models. Variants should differ in composition, intensity of development (number of storeys), degree of compactness.
• study sketches.
• choosing the best variant for further development
Stage III. Development of the architectural concept:
A 6-week stage of creative work on the selected design variant, in terms of functionality, technology and composition. It includes the development of an architectural design concept of the industry plant:
• land development plan (master plan) of the selected variant (1: 500). The plan should take into account: buildings, car roads, fire roads, parking lots for employees, parking lots for customers, maneuvering areas (delivery and export of goods), footpaths, high and low greenery, arrangement of "small architecture" and infrastructure.
• traffic patterns (flow of people and materials) in the master plan. Collision point analysis.
• silhouettes of the factory within the landscape context (1: 500).
• development of an architectural design of the whole or a fragment (in case of large scale) of the plant (1: 200). In the case of developing a fragment, the project should include hygienic and sanitary facilities for the employees, administrative and office part and gastronomy.
The accuracy and scope of the study should be similar to the "architectural concept" stage (according to SARP standards).
Minimum scope of project documentation: summary of analyses (or selected analyses), site development plan, silhouettes of the object on the landscape background, all floorplans, at least two sections, elevations, axonometry, exterior visualization.
Stage IV. Graphic design (architectural marketing):
4-week stage of work on the graphic presentation of the project. Includes:
• graphic design of final boards (100x70 cm format, obligatory use of the "Layout"). This part of work is the result of previous creative achievements and is an important element of promoting the student's work. It has a significant impact on the final grade. It should present the entire design cycle in an attractive graphic form: analytical study, initial compositional variants, selection of the best variant, development plan and architectural concept of the selected variant. During the evaluation, emphasis will be placed on the correctness of functional solutions, innovation and creativity of the proposed architecture, as well as the ability to present the most important advantages of the project.

## Teaching methods

1. Lecture with multimedia presentation
2. Project. Design class in the form of a direct contact with a tutor.
3. eKursy (a system supporting the teaching process and distance learning).

## Bibliography

Basic:
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Neufert E. Architect's Data, 6th Edition, Wiley, Hoboken, NJ, USA, 2023.
Wiendahl H.-P., Reichardt J., Nyhuis P. Handbook Factory Planning and Design. Springer, Berlin, 2015.
Legal acts:
Rozporządzenie Ministra Infrastruktury z 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (Dz.U. 2002, Nr 75, poz. 690).

Rozporządzenia Ministra Pracy i Polityki Socjalnej z 26 września 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy (Dz.U. 1997, Nr 129, poz. 844).
Rozporządzenie Ministra Spraw Wewnętrznych i Administracji z dnia 24 lipca 2009 r. w sprawie przeciwpożarowego zaopatrzenia w wodę oraz dróg pożarowych (Dz.U.2009, Nr 124, poz. 1030).
Rozporządzenie Ministra Infrastruktury z dnia 24 czerwca 2022 r. w sprawie przepisów techniczno-budowlanych dotyczących dróg publicznych (Dz.U. 2022, poz. 1518).

Additional:
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Monserrat-Gauchi J. Novo-Domínguez M. Torres-Valdés R. Interrelations between the media and architecture: Contribution to sustainable development and the conservation of urban spaces. Sustainability, Volume 11, Issue 20, 2019.
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Szparkowski Z. Architektura współczesnej fabryki. Wydawnictwo OWPW. Warszawa 1999.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 150 | 6,00 |
| 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) | 75 | 3,00 |