STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Steel Structures**		Code **1010102111010110073**
Field of study **Civil Engineering Second-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 1**
Elective path/specialty **Structural Engineering**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **30** Classes: **-** Laboratory: **-** Project/seminars: **30**		No. of credits **3**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences**		ECTS distribution (number and %) **3 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge in structural mechanics in the field of rod systems and strength of materials and information presented within the subject Metal Structures of the first degree.
2	**Skills**	Ability to determine stress. Ability to design basic metal structures using limit states and welded and screwed connections. Ability to calculate cross-sectional forces in statically determined and non-deterministic systems.
3	**Social competencies**	Awareness of the need to improve professional and personal competences. Understanding the need to educate the public about technical and technological processes in the construction industry in a universally understandable manner.

Assumptions and objectives of the course:

The aim of the classes is to introduce basic methods of designing crane beams, skeletal buildings, flyovers and lattice mattresses.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. 121/5000 Student knows principles of analysis, construction and dimensioning of elements of any building (metal structures) - [K_W02]
2. Student has the knowledge of solid state mechanics, knows principles of analysis of statics, stability and dynamics (metal) of bar structures, as well as surface (plate, disc and shell) and solid - [K_W03]
3. Student has the knowledge of analysis and optimization of metal structures and complex building systems, methods of solving tasks and performing non-linear calculations of engineering objects. - [K_W09]
4. Student knows the standards and guidelines for designing buildings (metal structures) and their components. - [K_W14]
5. Student knows principles of construction and design of general and industrial buildings - [K_W16]

Skills:

1. The student is able to assess and compile any burdens on buildings (metal structures) - [K_U01]
2. Student knows how to classify buildings (metal structures). - [K_U02]
3. Student is able to design elements and connections in complex metal structures. - [K_U03]
4. Student can critically evaluate the results of numerical analysis of engineering objects (metal structures). - [K_U07]
5. The student is able to measure complex structural details (steel structures) in general, industrial and transportation buildings. - [K_U09]
6. The student can choose tools (analytical or numerical) to solve engineering problems in metal constructions. - [K_U13]
7. The student is able to develop the project and draw up the technical documentation of metal structures in the environment of selected CAD programs - [K_U16]

Social competencies:
1. Student can - by performing specific tasks - work independently, cooperate in the team and lead the team. - [K_K01]
2. The student is responsible for the reliability of the results of his work and the evaluation of the work of his team - [K_K02]
3. The student himself completes and broadens his knowledge of modern processes and technologies in the building industry. - [K_K03]
4. Student is aware of the need to improve professional and personal competencies. - [K_K06]

Assessment methods of study outcomes
Lecture problem / conversational lecture / lecture and multimedia presentation. Illustrated slides and videos. Design exercises - industrial hall project with or without cranes. Passing the lecture - exam, Project exercises - project defense.
Grading scale:
5.0 - student gained over 90% points from the exam or project defense,
4,5 - student gained from 80% to 90% points from the exam or project defense,
4.0 - student gained from 70% to 80% of points from the exam or project defense,
3,5 - student gained from 60% to 70% of points from the exam or project defense,
3.0 - student gained from 50% to 60% of points from the exam or project defense,
2.0 - student gained less than 50% of the exam or project defense score.
Course description
- hall components,
- design of beams and suspended beams,
- clustered clamping pressures,
- calculation models of transverse systems,
- spatial co-operation of hall components,
- Welded corner and corner welded nodes in transverse halls,
- rules of knotting for their vulnerability,
- problems of calculation of eccentrically compressed columns with fixed, two-stage and convergent geometry,
- spatial stability of the halls (concentrations),
- steel flyovers-design,
- spatial structures of hall roofs
Basic bibliography:
1. Biegus A., (2008), Stalowe budynki halowe, Wydawnictwo Arkady, Warszawa, s. 342
2. Bródka J., Kozłowski A., (2009), Projektowanie i obliczanie połączeń i węzłów konstrukcji stalowych. Część 1. Polskie Wydawnictwo Techniczne, s. 600
3. Bródka J., Kozłowski A., (2009), Projektowanie i obliczanie połączeń i węzłów konstrukcji stalowych. Część 2. Polskie Wydawnictwo Techniczne, s. 843
4. Giżejowski, Ziółko J., (2010), Budownictwo ogólne. Tom 5. stalowe konstrukcje budynków projektowane wg eurokodów z przykładami obliczeń, Wydawnictwo Arkady, Warszawa, s. 1085
5. Kurzawa Z., (2011), Stalowe konstrukcje prętowe. Część 1. Hale przemysłowe oraz obiekty użyteczności publicznej, Wydawnictwo Politechniki Poznańskiej, Poznań, s. 368
6. Rykaluk K., (2006), Konstrukcje stalowe. Podstawy i elementy, Dolnośląskie Wydawnictwo Edukacyjne, Wrocław, s. 431
Additional bibliography:
1. PN-EN 1990 Eurokod: Podstawy projektowania konstrukcji
2. PN-EN 1991 Eurokod 1: Oddziaływania na konstrukcje
3. PN-EN 1993 Eurokod 3: Projektowanie konstrukcji stalowych

Result of average student's workload

Activity	**Time (working hours)**
1. Participation in lectures	30
2. Current preparation for lectures (repetition of material)	3
3. Preparing for the exam and the presence on the exam	12
4. Participate in design exercises	15
5. Independent work on the project at home	12
6. Preparing for project defense and project defense	3

Student’s workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	45	2
Practical activities	15	1