STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Steel Structures II		**1010115121010110128**
Field of study	Profile of study (general academic, practical)	Year /Semester
Civil Engineering Extramural Second-cycle	**(brak)**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Structural Engineering	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
Second-cycle studies	**part-time**	
No. of hours		No. of credits
Lecture: **10** Classes: **8** Laboratory: **-** Project/seminars: **18**		**4**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
(brak)	**(brak)**	
Education areas and fields of science and art		ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge in the field of strength of materials, structural mechanics and technology of steel structures. Knowledge in the field of steel structures from first-cycle studies and knowledge in steel structures from previous semester second-cycle studies.
2	**Skills**	Ability to determine the loads acting on the structure. Ability to calculate internal forces and stresses in statically determinate and indeterminate bar structures. Ability to design metal structures using limit state conditions and welded and bolted joints.
3	**Social competencies**	Consciousness of the need to raise professional and personal competences. Understanding the needs of dissemination the knowledge of the technical processes and technology in the structural engineering in commonly understood way.

Assumptions and objectives of the course:

The aim of the course is making the students acquainted with the design of space structures of the bar, arch structures, tension and membrane structures (interchangeable masts, towers, tanks).

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

Knowledge:

1. Student knows the principles of analysis, construction and designing of the elements of any buildings (metal structures). - [K_W02]

2. Student has knowledge of solid mechanics, knows the rules of the analysis of issues of statics, stability and dynamics of the (metal) bar structures, and surface (plate, shield and shell) and solid. - [K_W03]

3. Student has knowledge of the analysis and optimization of metal structures and parts of complex building systems, methods for solving nonlinear and perform engineering calculations. - [K_W09]

4. Student knows the standards and guidelines for the design of buildings (metal construction) and their elements. - [K_W14]

5. Student knows the principles of building and designing of objects of general construction, industrial, and communications (metal structures). - [K_W16]

Skills:

1. Student is able to assess and statement of any loads acting on buildings (metal structures). - [K_U01]
2. Student is able to classify buildings (metal structures). - [K_U02]
3. Student knows how to design elements and connections in complex metal structures. - [K_U03]
4. Student is able to critically assess the results of the numerical analysis of engineering structures (metal structures). - [K_U07]
5. Student knows how to design complex construction details (metal structures) in buildings of general construction, industrial, and communications. - [K_U09]
6. Student is able to analyze the risks associated with projects and exploitation of buildings (metal structures) and implement appropriate measures and rules of safety. - [K_U12]

Social competencies:

1. Student can - executing certain tasks - work independently, to work in a team and manage a team. - [K_K01]
2. Student is responsible for the accuracy of the results of their work and the evaluation of the work of subordinate team. - [K_K02]
3. Student independently complements and extends knowledge of modern techniques, processes and technology. - [K_K03]
4. Student is aware of the need to raise his professional and personal competences. - [K_K06]

Assessment methods of study outcomes

The lecture is illustrated with multimedia presentations and films. Design exercises - project of the industrial hall with or without the overhead travelling crane. The lecture - examination, design exercises - defence of the project.

Grades scale:

5,0 - the student got above 90 % points from the exam or project defense,

4,5 - the student got 80 % to 90 % points from the exam or project defense,

4,0 - the student got 70 % to 80 % points from the exam or project defense,

3,5 - the student got 60 % to 70 % points from the exam or project defense,

3,0 - the student got 50 % to 60 % points from the exam or project defense,

2,0 - the student got below 50 % points from the exam or project defense.

Course description

- space structures: space truss and space decks,
- tension-bar structures: cable roofs, suspension roofs, arch structures,
- structures susceptible to dynamically: towers and masts,
- shell structures: structures with textile membranes, tanks for liquids and gases, bunkers for loose materials.

Basic bibliography:

1. Biegus A., (2008), Stalowe budynki halowe, Wydawnictwo Arkady, Warszawa, s. 342 (in Polish)

2. Bogucki W., (1982) Poradnik projektanta konstrukcji metalowych. Tom 1, Wydawnictwo Arkady, Warszawa, s. 560 (in Polish)

3. Bogucki W., (1980) Poradnik projektanta konstrukcji metalowych. Tom 2, Wydawnictwo Arkady, Warszawa, s. 788 (in Polish)

4. Bródka J., Broniewicz M., (2010), Projektowanie konstrukcji stalowych wg Eurokodów, Polskie Wydawnictwo Techniczne, Warszawa, s. 739 (in Polish)

5. Bródka J., Kozłowski A., (2009), Projektowanie i obliczanie połączeń i węzłów konstrukcji stalowych. Część 1, Polskie Wydawnictwo Techniczne, s. 600 (in Polish)

6. Bródka J., Kozłowski A., (2009), Projektowanie i obliczanie połączeń i węzłów konstrukcji stalowych. Część 2, Polskie Wydawnictwo Techniczne, s. 843 (in Polish)

7. Giżejowski M., Ziółko J., (2010), Budownictwo ogólne. Tom 5. Stalowe konstrukcje budynków projektowane wg eurokodów z przykładami obliczeń, Wydawnictwo Arkady, Warszawa, s. 1085 (in Polish)

8. Jankowiak W., (1992), Wybrane konstrukcje stalowe. Część1, Wydawnictwo Politechniki Poznańskiej, Poznań, s. 301 (in Polish)

9. Jankowiak W., (1994), Wybrane konstrukcje stalowe. Część 2, Zbiorniki. Zasobniki. Konstrukcje wiszące, Wydawnictwo Politechniki Poznańskiej, Poznań, s. 165 (in Polish)

10. Kozłowski A., (2012), Konstrukcje stalowe. Przykłady obliczeń wg PN-EN 1993-1. Część 1. Wybrane elementy i połączenia, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów, s. 396 (in Polish)

11. Kozłowski A., (2012), Konstrukcje stalowe. Przykłady obliczeń wg PN-EN 1993-1. Część 2. Stropy i pomosty, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów, s. 498 (in Polish)

12. Kurzawa Z., (2011), Stalowe konstrukcje prętowe. Część 1. Hale przemysłowe oraz obiekty użyteczności publicznej, Wydawnictwo Politechniki Poznańskiej, Poznań, s. 368 (in Polish)

13. Kurzawa Z., (2011) Stalowe konstrukcje prętowe. Część 2. Struktury przestrzenne, przekrycia cięgnowe, maszty i wieże, Wydawnictwo Politechniki Poznańskiej, Poznań, s. 235 (in Polish)

14. Pałkowski Sz., (1994), Konstrukcje cięgnowe, Wydawnictwo Naukowo-Techniczne, Warszawa, s. 200 (in Polish)

15. Pałkowski Sz., (2010), Konstrukcje stalowe. Wybrane zagadnienia obliczania i projektowania, Wydawnictwo Naukowe PWN, Warszawa, s.215 (in Polish)

16. PN-EN 1990 Eurocode: Basis of structural design

17. PN-EN 1991 Eurocode 1: Actions on structures

18. PN-EN 1993 Eurocode 3: Design of steel structures

19. PN-90/B-03200 Konstrukcje stalowe. Obliczenia statyczne i projektowanie (in Polish)

Additional bibliography:

1. Biegus A., (1997), Nośność graniczna stalowych konstrukcji prętowych, Państwowe Wydawnictwo Naukowe, Warszawa-Wrocław, s. 183 (in Polish)

2. Bogucki W. (1976), Budownictwo stalowe. Część 1, Wydawnictwo Arkady, Warszawa, s. 451 (in Polish)

3. Bogucki W. (1977), Budownictwo stalowe. Część 2, Wydawnictwo Arkady, Warszawa, s. 444 (in Polish)

4. Bogucki W., Żyburtowicz M., (2008), Tablice do projektowania konstrukcji metalowych, Wydawnictwo Arkady, Warszawa, s.399 (in Polish)

5. Jankowiak W., (1983), Konstrukcje metalowe, Państwowe Wydawnictwo Naukowe, Warszawa-Poznań, s. 916 (in Polish)

6. Kurzawa Z., Chybiński M., (2008), Projektowanie konstrukcji stalowych, Wydawnictwo Politechniki Poznańskiej, Poznań, s. 322 (in Polish)

7. Łubiński M., Filipowicz A., Żółtowski W., (2008), Konstrukcje metalowe. Część 1. Podstawy projektowania, Wydawnictwo Arkady, Warszawa, s. 646 (in Polish)

8. Łubiński M., Żółtowski W., (2007), Konstrukcje metalowe. Część 2. Obiekty budowlane, Wydawnictwo Arkady, Warszawa, s. 566 (in Polish)

9. Rykaluk K., (2006), Konstrukcje stalowe. Podstawy i elementy, Dolnośląskie Wydawnictwo Edukacyjne, Wrocław, s. 431 (in Polish)

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	10
2. Current preparation for lectures (repeat material)	15
3. Preparation for the final exam and the attendance at the exam	25
4. Participation in projects	26
5. Work on a project at home	10
6. Preparation for a defence of the project and its defend	14

Student's workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	36	2
Practical activities	64	2