STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Metal Structures**		Code **1010102121010113705**
Field of study **Structural Engineering Second-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 2**
Elective path/specialty **-**	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: **15** Classes: **15** Laboratory: **-** Project/seminars: **15**		No. of credits **4**
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 %) **4 100%**

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**	Has knowledge of structural mechanics and strength of materials in the area of structural engineering. Knows the basic design method of industrial halls. Presents the design issues of spatial steel truss structures.
2	**Skills**	Uses the design standards for structural analysis and dimensioning of steel structural elements, design structural elements of trusses in industrial buildings and bracing systems.
3	**Social competencies**	Understand the need for lifelong learning and knows how to interact and work in a group, taking the different roles.

Assumptions and objectives of the course:

Gaining of knowledge and skills in design methods of frame buildings, cranes construction suspended structures, masts, towers, chimneys and thin-walled structures.

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

Knowledge:

1. Familiar with basic principles of structural design concerning the cable structures as a roof - [K2_W02, K2_W14]
2. Knows design issues of structural elemens susceptible dynamically: chimneys, towers and masts - [K2_W03, K2_W14]
3. Presents general principles and methods of structural analysis and design principles of thin-walled cold-rolled purlin cooperating with sheathing - [K2_W05, K2_W16]

Skills:

1. Uses the building standards for structural analysis and dimensioning of structures susceptible dynamically and thin walled - [K2_U03, K2_U04, K2_U07, K2_U14_]
2. Able to design the components of towers, masts and suspension construction - [K2_U04, K2_U13, K2_U14]
3. Able to design thin-walled purlin restrained by sheeting - [K2_U03, K2_U14]

Social competencies:

1. Understand the need for lifelong learning; able to inspire and organize the learning process of others - [K2_K02, K2_K03]
2. Able to interact and work in a group, taking the different roles - [K2_K01, K2_K06]
3. Correctly identifies and resolves dilemmas associated to his profession - [K2_K07]

Assessment methods of study outcomes

-evaluation of individual student projects combined with an oral defense of the thesis, content test in exercises (1 per semester - 1.5 hours)

test in the lectures. (1 per semester - 1.5 hours)

The evaluation scale:

more than 100 excellent

91-100 very good (A)

81 - 90 good plus (B)

71 - 80 Good (C)

61 - 70 is sufficient plus (D)

51 - 60 satisfactory (E)

insufficient under 50 (F)

Course description

Form of teaching: lecture

Basic information on the structural design of structures susceptible dynamically: chimneys, towers and masts. Structural stability of steel portal frames. Principles of the location of the bracings in single-storey structures (single- or multi-bay). Design procedures of bracings according to EN1993-1-1: 2005+AC 2006. Rules for the production and design of cold-rolled construction. Issues of loss of stability of thin-walled elements in compression, bending and eccentrically-compressed. Global and local stability of thin-walled components axial compression, bending, eccentric compression. Ultimate and serviceability limit state and design methods for beams partially restrained by sheeting. Cable structures. Characteristics of the selected cable structures. Principles of the cable structure response. Elementary cable mathematics: load extension relationship, radius of circular arc, centenary loaded vertically, pre-stressed cable, two-way cable net. Two-dimensional tension structures: suspension bridges, draped cables, cable-stayed beams, cable trusses. Three-dimensional tension structures and surface stressed structures: cable truss systems, pneumatically-stressed, pre-stressed. Examples of the erected cable structures. Space structures. Wide-span space structures. Two-ways ?spacing trusses versus space deck systems. Structural load transmission at different grid density level. Design procedures and examples of the erected space structures.

Form of teaching: classes

Modeling and designing roofs, ceilings, towers and masts. Calculation algorithms thin-walled structures. Principles of design, construction and dimensioning thin-walled purlins and other elements of thin-walled structures. Structural solution of welded and bolted connections.

Form of teaching: projects

The project of thin-walled purlins restrained by sheathing.

Basic bibliography:

1. Unified Design of Steel Structures, 1st Edition, Louis F. Geschwindner, John Wiley & Sons , 2008

2. Structural Stability of Steel: Concepts and Applications for Structural Engineers, Theodore V. Galambos, Andrea E. Surovek, John Wiley & Sons , 2008

3. The Behaviour and Design of Steel Structures to EC3.S, Trahair, M.A. Bradford, D.A. Nethercot, L. Gardner , Balkema, 2007

4. Structural Design of Steelwork to EN 1993 and EN 1994, , Lawrence Martin, Elsevier, 2007

Additional bibliography:

1. Steel Buildings: Analysis and Design, 4th Edition, Stanley W. Crawley, Robert M. Dillon, John Wiley & Sons , 2008

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in exercise classes	15
3. Participation in design classes	15
4. Complete (at home) works involved in the project	20
5. Participation in the consultations of the exercise and design classes	10
6. Preparing to the test in the field of lectures	20
7. Preparing to the test in the field of exercise classes	15

Student's workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	55	2
Practical activities	60	2