



1. Course number and name

RB-S1-19-S7D-E2, **Selected Steel and Steel-Concrete Composite Structures**

2. Credits and contact hours*

2 ECTS, lectures: 30 hours**, classes: 0 hours**, project: 0 hours**

3. Instructor's or course coordinator's name

Grzegorz Gremza PhD

4. Text book, title, author, and year

- Simms W.I., Hughes A., F.: Composite design of steel framed buildings. SCI Publication P359, Steel Construction Institute, 2011
- Rackham J. W., Couchma G. H., Hicks S. J: Composite slabs and beams using steel decking: Best practice for design and construction. MCRMA Technical Paper No. 13 SCI Publication P300, The Metal Cladding & Roofing Manufacturers Association March 2009
- Sedlacek G. et al.: Assessment of Existing Steel Structures – Recommendations for Estimation of the Remaining Fatigue Life. Office for Official Publications of the European Communities (JRC), 2008
- Sigmund C.: Worked examples in accordance with European standards. Carlo Sigmund 2014
- Collective work: Design Manual for structural stainless steel. SCI Publication Number P413, 4th ed., 2014
- Model Code for steel chimneys. Rev. 2. CICIND 2010

a. other supplemental materials

- EN 1991-1-4. Eurocode 1: Actions on structures. General actions. Part 1-4. Wind actions.
- EN 1993-3-1. Eurocode 3: Design of steel structures - Part 3-1: Towers, masts and chimneys – Towers and masts
- EN 1993-3-2. Eurocode 3: Design of steel structures - Part 3-2: Towers, masts and chimneys – Chimneys.

5. Specific course information

a. brief description of the content of the course (catalog description)

Lectures:

Part 1. Composite steel and concrete structures: (1) Examples of application, benefits. (2) Plastic and elastic moment of resistance of beams, shear resistance and stiffness. Shear connection between slab and steel beam. Types of connectors. (3) Encased composite columns and CFST members. Stability of encased column as a part of composite frame. (4) Composite slabs with profiled steel decking. (5) Influence of shrinkage, creep, temperature and sequence of construction on the load capacity.

Part 2. Selected issues on steel structures: (1) Along-wind response of chimneys and towers. (2) Fatigue loads caused by vortex excitation. (3) Basis of calculation and construction of lattice towers and masts. (4) Industrial chimneys (stacks) – types,



selected details, influence of corrosion and high temperature. (5) Corrosion of steel structures –proper formation of members, protection by painting or galvanizing, application of stainless and wear-resistant steels. (6) Basic information in terms of material toughness, through-thickness properties and brittle fracture of steel members.

b. prerequisites or co-requisites

No prerequisites and additional requirements

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required.

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic

The student can:

- Student knows the principles of mechanics and analysis of structures in terms of statics, dynamics and stability of selected steel and steel-concrete structures. Student is able to evaluate and combine the loads on selected building structures – towers and chimneys.
- Student knows the rules of construction of composite building structures and selected industrial steel (i.e. chimneys and towers).
- Student is able to define computational models of computer analysis of the selected structure and critically evaluate the results of this analysis. Student is responsible for the accuracy of the results of their work and their interpretation.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

K1A_W05, K1A_U04

7. Brief list of topics to be covered

1. Steel-concrete composite structures: design rules for buildings, typical applications, calculation and construction of composite slabs, beams and columns.
2. Tower-like structures as lattice towers, chimneys and masts: specification of wind load, along and across wind response, topology, typical details, structural calculation.
3. Selected material issues: corrosion protection of structural steel, application of weather-resistant and stainless steel, basic information about through-thickness properties, brittle fracture and fatigue of steel members.

*- Consultations were not included in the contact hours

** - per semester