

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Masonry</b>		Code <b>1010101131010114682</b>
Field of study <b>Sustainable Building Engineering First-cycle</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>2 / 3</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>15</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Monika Siewczyńska email: monika.siewczynska@put.poznan.pl tel. 6652864 Civil and Environmental Engineering ul. Piotrowo 5 Poznan		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
<b>1</b>	<b>Knowledge</b>	- basic knowledge in the field of mathematics and physics - basic knowledge of engineering graphics - basic knowledge of the strength of materials - basic knowledge of building materials - basic knowledge of general construction
<b>2</b>	<b>Skills</b>	- using available sources of information - calculations of physics tasks
<b>3</b>	<b>Social competencies</b>	- is responsible for the reliability of his calculations - is aware of raising their competences
<b>Assumptions and objectives of the course:</b> Acquisition by the student of basic knowledge of the nature of the work of masonry structures and the ability to check the bearing capacity of basic elements of masonry structures		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. is familiar with building code, national standards (PN) and European standards (EN) - [KSB_W07] 2. is familiar with the principles of construction and analysis of construction works in general civil - [KSB_W10] 3. is familiar with commonly used construction materials and their properties, basic principles of manufacturing and assembly, basic elements in their design - [KSB_W14] 4. has well-founded theoretical knowledge about key issues in the history of architecture - [KSB_W18]		
<b>Skills:</b>		
1. can list load combinations acting on construction works and carry out static analysis of rod constructions statically determinate and indeterminate - [KSB_U06] 2. knows how to make use of select computer software packages to assist in design decisions in sustainable building engineering including software based on BMI technology; knows how to critically assess results obtained of numerical analysis of construction works - [KSB_U09] 3. knows how to design select elements and simple constructions on masonry - [KSB_U10] 4. knows how to dimension basic construction elements in general construction works - [KSB_U11] 5. knows how to carry out analysis of linear stability and ultimate state limits of simple rod constructions in terms of assessment of critical and ultimate states - [KSB_U13]		

**Social competencies:**

1. takes responsibility for reliability of results and their interpretation - [KSB\_K02]
2. is aware of the necessity of developing professional and personal competencies; understands and is aware of possibilities of continuous learning (second and third cycle studies, postgraduate courses) - [KSB\_K05]
3. has the skill of critical assessment of results of his work - [KSB\_K08]
4. understands the necessity to protect copyright laws and is aware of principles of professional ethics - [KSB\_K09]

**Assessment methods of study outcomes**

Lectures - final test in writing 10 roofing questions.

Projects - a written study containing calculations of a masonry structure.

At least 50% of correct answers or 10 open questions are required to pass the colloquium. Punctuation:

100% - 91% of the rating 5.0

90% - 81% of the rating 4.5

80% - 71% rating 4.0

70% - 61% rating 3.5

60% - 50% of the rating 3.0

49% - 0% mark 2.0

Giving instructions on how to construct a hand structure calculating a masonry structure. Punctuation:

- 5 days worked out

- developed, ready, completed after the deadline - 4.5

- preparation carried out correctly, minor non-substantive errors, completed on time - evaluation of 4.0

- correctly elaborated, minor non-substantive errors, submitted after the deadline - 3.5 mark

- executive elaboration incorrectly, but corrected in oral speech during project submission, minor non-substantive errors - grade 3.0

- executive elaboration incorrectly, factual errors, postponed - assessment 2.0

**Course description**

Lecture 1

History of masonry structures

- changing the types of masonry structures from antiquity to the present day

Types of masonry structures

- walls

- arches, vaults

- pole and beam

Lecture 2

Characteristics of elements of masonry structures

- masonry elements

- mortar

Systems of masonry structures

- Ytong, Silka, Porotherm systems, etc.

- clinker facade systems

- reinforced concrete system

Lecture 3

Building loads according to PN and EC

- permanent and utility loads

Building loads according to PN and EC

- snow and wind loads

Lecture 4

Building loads according to PN and EC

- combinatorics of loads

Dimensioning of non-reinforced masonry structures according to EC

- dimensioning of structures loaded with concentrated force, horizontal load

Lecture 5

Dimensioning of unreinforced masonry structures according to EC c.d.

- dimensioning of structures mainly loaded vertically

Construction requirements for masonry structures

- simplified dimensioning methods

Lecture 6

Failures of masonry structures

- rules for carrying out the expertise

- diagnostic methods

Lecture 7

Repair methods of masonry structures

- eliminating the causes

- changing the spatial rigidity of the building

- reproducing the original technical condition

- interfering with the static scheme of construction work

Historic masonry buildings

- presentation of selected historic masonry structures from the area of Wielkopolska, Poland and the world

Lecture 8

Final test

Project 1

Construction scheme of a single-family residential building

- Exercises to determine construction diagrams for different building variants

Project 2

Types of structural loads

- Exercise of applying loads and determining reactions

Building load according to PN and EC - permanent loads

- Collection of surface fixed loads in a single-family residential building

Project 3

Building load according to PN and EC - service loads and snow

- Collecting surface payloads and snow

Building load according to PN and EC - wind loads

- Collecting surface wind loads on the roof and walls of the building

Project 4

Dimensioning the window lintel and checking the load capacity of the wall under concentrated load

- Collect loads on window lintels and check the pressure under the overhead beam

Building load according to PN and EC - loads concentrated on the pier

- Collecting loads on the window frame

Project 5

Building load according to PN and EC - load combination

- Determination of the maximum system of forces for the window frame from load combinatorics

Dimensioning of the intersubricum pier

- Checking the possibilities and dimensioning of the pier using the simplified method

Project 6

Dimensioning of the intersubricum pier

- Dimensioning of the pier using the frame method

Project 7

Dimensioning of the intersubricum pier

- Dimensioning of the pier by articulation

Dimensioning of the intersubricum pier

- Comparison of the known methods of dimensioning the pier

Project 8

Returning projects

### Basic bibliography:

1. Hendry A. W., Sinha B. P., Davies S. R., Design of masonry structures Third edition of load bearing brickwork design (internet)
2. Siewczynska M., Workbook for design of masonry structures, Wydawnictwo ApuntoPress, Poznań, 2019
3. How to design masonry structures using Eurocode 6 (pdf)

<b>Additional bibliography:</b>		
1. Hall Loretta, Historic bricks, rap air or replace, Concrete Decor and PaintPRO Magazines		
2. Penazzi D., Valluzzi M.R., Saisi A., Binda I., Modena C., Repair and strengthening of historic masonry buildings in seismic areas		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in lectures (contact hours)	15	
2. Participation in exercises (contact hours)	15	
3. Preparing for the exercises (independent work)	4	
4. Preparation for the colloquium (independent work)	4	
5. Participation in consultations related to the implementation of the education process (contact hours)	2	
6. Preparation for passing lectures (independent work)	8	
7. Additional own work - literature study (independent work)	2	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	60	2
Contact hours	30	1
Practical activities	15	0