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Erasmus+ Programme  
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## MODULE DESCRIPTION

Originating Institutions	Module Co-ordinator(s)
Vilnius Gediminas Technical University (VGTU)	Assoc. Prof. Dr Laura Tupenaite Assoc. Prof. Dr Tomas Gecys Assoc. Prof. Dr Loreta Kanapeckiene
VIA University College (VIA UC)	Instructor Jan Uwe Wolf
Coventry University (COVUNI)	Assist. Prof. Carl Mills Assist. Prof. David Trujillo
Häme University of Applied Sciences (HAMK)	Lector Jari Komsu Lector Anssi Knuutila
Riga Technical University (RTU)	Prof. Ineta Geipele Dr. Kristine Fedotova Janis Zvirgzdins

### TITLE OF THE MODULE

Title of the module
Design, Construction and Management of Wooden Public Buildings

### PROGRAMME(S) IN WHICH TO BE OFFERED

Civil Engineering, Construction and Real Estate Management (VGTU) Architectural Technology and Construction Management, Civil Engineering (VIA UC) Architectural Technology, Civil Engineering (COVUNI) Civil Engineering (HAMK) Real Estate Management (RTU)
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### LEVEL OF STUDIES<sup>1</sup>

First cycle (BSc/BA) <input checked="" type="checkbox"/>	Second cycle (MSc/MA) <input type="checkbox"/>	Third cycle (PhD) <input type="checkbox"/>
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### CREDITS AND LEARNING HOURS

ECTS Value <sup>2</sup>	Indicative academic learning hours <sup>3</sup>	Length (in Semesters)
9	250	1

### DISTRIBUTION OF LEARNING HOURS

<sup>1</sup> According to the Framework of Qualifications for the European Higher Education Area, Annex 8: [http://www.aic.lv/ace/ace\\_disk/Bologna/Bergen\\_conf/Reports/EQFreport.pdf](http://www.aic.lv/ace/ace_disk/Bologna/Bergen_conf/Reports/EQFreport.pdf)

<sup>2</sup> European Credit Transfer System, 1 ECTS = 25-30 academic learning hours.

<sup>3</sup> 1 academic learning hour is equal to 45 minutes



Lectures	Individual studies	Project based learning/guidance from teachers	Total
62	63	125	<b>250</b>

## SUMMARY

The module provides understanding of wooden construction in the context of sustainable development, introduces wood as construction resource and material, architectural and structural design principles of sustainable wooden public buildings, describes construction process and its management, use and maintenance issues, provides best practice examples.

The theory and methodology of the module are mastered during lectures, by studying professional literature and interactive resources. Special and general skills are developed by project based learning and blended learning approaches.

## AIM OF THE MODULE

The module aims to provide students with the theory and methods of design, construction and management of sustainable wooden public buildings.

## LEARNING AND TEACHING STRATEGIES

The basis of the course is formed around the education methodologies “problem-based learning”, “learning by doing” and “blended learning”.

Small transdisciplinary groups consisting of 5–6 students shall be formed. It is recommended to include architectural technology, civil engineering, construction and real estate management students.

The course contains three main parts: theoretical face-to-face lectures (25% of all hours), practical teamwork on project (50% of all hours) and individual learning (25% of all hours).

Face-to-face lectures must be delivered by the transdisciplinary group of teachers.

Project work of students is guided by prepared assignment, real site visits and instructors. Students have to develop a proposal for the client for the new sustainable public wooden building. Project work is divided into building planning and management phases, used in the building design and construction sector, namely:

### Brief phase

Requirements for the project are decided by the Client or Client advisors and the Architect.

### Outline proposal phase

- ✓ Preliminary small scale drawings showing form and function of project.
- ✓ Building components, materials and form and function to be decided.



### **Scheme Design proposal phase**

All fundamental decisions are made and all major problems are solved in this phase.

### **Detail 1 phase**

Drawings and documents for final local authority approval must be completed.

### **Detail 2 phase (Working drawings)**

Detail 2 phase is based on Detail 1 phase. Explicit detailing of the project is made to such a degree that it can be tendered for bids and realization of the projects implementation.

Each group is required to develop the following outputs: precedence analysis; sustainability and BREEAM design considerations; concept design with plans, sections, elevations and 3D illustration; technical excellence including sizes and types of timber, connections, foundations and specification; identification of services, U-values, fire, humidity, ventilation, drainage, lighting, pathways of escapes and DDA compliance (access for disabilities); the programme of works, costings, life cycle analysis, site management, health and safety requirements; presentation of final project in PowerPoint format.

Virtual learning encompasses individual studies of learning materials (readings, presentations, video materials, etc.) online at Moodle environment. In this way e-learning is combined with traditional classroom methods and problem-based learning approach.

Students have to prepare a report and final 20 minutes presentation of the project to be defended against jury of teachers. Grades are given by the jury using the ECTS scale, based on achieved learning outcomes.



**INTENDED LEARNING OUTCOMES AND ASSESSMENT**

<b>Learning Outcomes of the module</b>	<b>Teaching and Learning Activities</b>	<b>Assessment methods of student achievements</b>	<b>Assessments criteria of students achievements by assessment levels</b>
O1. Knows different design and construction methods (load bearing systems) in wood	Lectures Problem based learning Blended learning	<input checked="" type="checkbox"/> Problem-based questions <input checked="" type="checkbox"/> E-tests <input type="checkbox"/> Regular tests <input checked="" type="checkbox"/> Problem-based tasks <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Peer evaluation <input type="checkbox"/> Automated feedback <input checked="" type="checkbox"/> Final evaluation	<i>Threshold achievement level</i> Knows different design and construction methods (load bearing systems) in wood, but has limited understanding of application
			<i>Typical achievement level</i> Knows different design and construction methods (load bearing systems) in wood, has application skills
			<i>Excellent achievement level</i> Knows different design and construction methods (load bearing systems) in wood, has advanced application skills
O2. Knows and understands structural design principles of public wooden buildings	Lectures Problem based learning Blended learning	<input checked="" type="checkbox"/> Problem-based questions <input checked="" type="checkbox"/> E-tests <input type="checkbox"/> Regular tests <input checked="" type="checkbox"/> Problem-based tasks <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Peer evaluation <input type="checkbox"/> Automated feedback <input checked="" type="checkbox"/> Final evaluation	<i>Threshold achievement level</i> Knows and understands structural design principles of public wooden buildings, has minimum application skills
			<i>Typical achievement level</i> Knows and understands structural design principles of public wooden buildings, has application skills
			<i>Excellent achievement level</i> Knows and understands structural design principles of public wooden buildings, has advanced application skills
O3. Knows and understands construction site management process	Lectures Problem based learning Blended learning	<input checked="" type="checkbox"/> Problem-based questions <input checked="" type="checkbox"/> E-tests <input type="checkbox"/> Regular tests <input checked="" type="checkbox"/> Problem-based tasks <input checked="" type="checkbox"/> Projects	<i>Threshold achievement level</i> Knows and understands construction site management process, is able to draw simple plans
			<i>Typical achievement level</i>



Sustainable Public Buildings Designed and Constructed in Wood (Pub-Wood)

		<input type="checkbox"/> Peer evaluation <input type="checkbox"/> Automated feedback <input checked="" type="checkbox"/> Final evaluation	<p>Knows and understands construction site management process, is able to draw plans</p> <p><i>Excellent achievement level</i> Knows and understands construction site management process, is able to draw detail plans</p>
O4. Knows and understands maintenance principles of wooden public buildings	Lectures Problem based learning Blended learning	<input checked="" type="checkbox"/> Problem-based questions <input checked="" type="checkbox"/> E-tests <input type="checkbox"/> Regular tests <input checked="" type="checkbox"/> Problem-based tasks <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Peer evaluation <input type="checkbox"/> Automated feedback <input checked="" type="checkbox"/> Final evaluation	<p><i>Threshold achievement level</i> Knows and understands maintenance principles of wooden public buildings, has limited skills to develop maintenance plan</p>
			<p><i>Typical achievement level</i> Knows and understands maintenance principles of wooden public buildings, is able to develop maintenance plan</p>
			<p><i>Excellent achievement level</i> Knows and understands maintenance principles of wooden public buildings, is able to develop detail maintenance plan</p>
O6. Has social skills: group work, critical thinking, problem solving skills, is able to apply these skills in construction project	Problem based learning	<input type="checkbox"/> Problem-based questions <input type="checkbox"/> E-tests <input type="checkbox"/> Regular tests <input checked="" type="checkbox"/> Problem-based tasks <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Peer evaluation <input type="checkbox"/> Automated feedback <input checked="" type="checkbox"/> Final evaluation	<p><i>Threshold achievement level</i> Limited use of initiative, judgement, contribution to group work, adherence to deadlines and effective project management.</p>
			<p><i>Typical achievement level</i> Reasonable use of initiative, judgement, contribution to group work, adherence to deadlines and effective project management.</p>
			<p><i>Excellent achievement level</i> Excellent use of initiative, judgement, contribution to group work, adherence to deadlines and effective project management.</p>



### ASSESSMENT:

Assessment components (in chronological order of submission/examination date)			
Type of assessment	Weighting, %	Duration	Component pass required
Test 1 (Design)	10%	30 min	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Test 2 (Construction)	10%	30 min	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Test 3 (Maintenance)	10%	30 min	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Mid-term assessment of the project	30%	Oral examination, 20 min	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Final assessment of the project	40%	Presentation 20 min	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<b>Total:</b>	100%		

### LECTURE TOPICS

No.	Topic	Number of hours
1.	Introduction to the course	2
2.	Sustainable development and wooden construction	4
3.	Sustainable building rating systems	4
4.	Wood as construction resource and material	4
5.	Use of BIM	4
6.	Structural design of sustainable public wooden buildings	6
7.	Moisture performance of wooden buildings	4
8.	Fire safety assurance	4
9.	Acoustics and noise abatements	4
10.	Design of service systems	4
11.	Management and leadership in construction project	4
12.	Typical wooden construction solutions	4
13.	Quality assurance	4
14.	Construction process management	6
15.	Use and maintenance of wooden public buildings	4
	<b>Total:</b>	62



### TASKS FOR PROBLEM-BASED LEARNING

No.	Task	Number of hours
1.	Brief phase: analysis of requirements for the project by the Client or Client advisors, precedence analysis	5
2.	Sustainability and BREEAM design considerations	10
3.	Concept design with plans, sections, elevations and 3D illustration	20
4.	Identification of services, U-values, fire, humidity, ventilation, drainage, lighting, pathways of escapes and DDA compliance (access for disabilities)	20
5.	Programme of works, costings, life cycle analysis, site management, health and safety requirements	20
6.	Scheme proposal	20
7.	Working drawings	25
8.	Presentation of final project in PowerPoint format	10
<b>Total:</b>		<b>125</b>

### LEARNING MATERIALS

#### Core materials (up to 5 references):

1. Tupenaite, L., & Geipele, I. (Eds). (2020). Design, Construction and Management of Wooden Public Buildings. Riga, 2020. <http://www.pubwood.eu/>
2. Thisleton, W., & Bader, B. DETAIL 1-2/2018 - Timber Construction.
3. EN 1995-1-1:2004 Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings.  
<https://www.phd.eng.br/wp-content/uploads/2015/12/en.1995.1.1.2004.pdf>
4. EN 1995-1-2:2004 Eurocode 5: Design of timber structures - Part 1-2: General - Structural fire design. <https://www.phd.eng.br/wp-content/uploads/2015/12/en.1995.1.2.2004.pdf>

#### Supplementary materials (up to 10 references):

1. Zaya, A. F., & Diener, T. (2017). Heavy Timber Structures: Creating Comfort in Public Spaces. Schiffer.
2. Lennartz, M. W., & Jacob-Freitag, S. (2015). New Architecture in Wood. BIRKHÄUSER.
3. Breyer, D., Cobeen, K., Fridley, K., & Pollock, F. (2014). Design of Wood Structures-ASD/LRFD (7th ed.). McGraw-Hill Education.
4. Hugues, T., Steiger, L., & Weber, J. (2004). Timber Construction. BIRKHÄUSER.
5. Mayo, J. (2015). Solid Wood: Case Studies in Mass Timber Architecture, Technology and Design. Routledge.

#### On-line resources:

Available at Moodle environment: <http://kursai.vgtu.lt/course/view.php?id=5>





### REQUIRED IT RESOURCES

No.	Software, manufacturer
1.	MS Word
2.	MS Excel
3.	MS Power Point
4.	Adobe Acrobat reader
5.	Revit/ArchiCad/AutoCad