SYLLABUS

Name of the course (as specified in the approved curriculum) Wood fire protection			Number of ECTS credits 3
Name of the course in Polish Ochrona drewna przed ogniem			
Unit providing the course (Department/Institute) Department of Wood Chemical Technology			
Course co-ordinator Prof. Dr. hab. Bartłomiej Mazela, Dr. Wojciech Grześkowiak			
Field of study Erasmus program	Level	Profile	Semester

TYPE OF CLASSES AND COURSE LOAD

(lectures and self-learning of the student)

Mode of studies: full-time	
- lectures	20
- practical classes	30
- contact hours	8
- Self- learning	45
Total number of hours:	103

OBJECTIVE OF THE COURSE

Fire safety for timber buildings and structures is the key issue in novel technologies of new wood-based materials production. Timber is a natural composite, and its behavior in fire conditions and fire resistance depends both on its physical structure (morphology) and features of its chemical structure as well as material chemical composition.
The aim of the course is to familiarize students with the theory and practice related to the flammability of wood, its protection with chemical flame retardants, as well as the mechanisms of action of these measures

TEACHING METHODS

Lectures based on multimedia presentation with elements of discussion. Laboratory testing

	Course learning outcomes	The reference to field of study outcomes
Knowledge	O1 has advanced knowledge of chemistry and related sciences adjusted to wood technology	WS2A_K03
	O2 reveals expertise of advanced methods and tools used for solving problems in area of wood technology	WS2A_K07
	O3 reveals expertise of advanced method, techniques, technologies, tools and materials in the scope of wood technology as it enables to utilize and develop potential of nature in order to improve human living quality	WS2A_K10
Skills	O4. has skills to seek out, understand and analyze information in a range of wood technology as coming from different sources and given in different form, as well creative interpretation of information, derive conclusions, express and justify opinion	WS2A_S01
	O5 is able to plan independently and carry out research or design tasks in the area of wood technology, as well as analyze and assess correctness of carried out tasks	WS2A_S04
	O6 is able to analyze independently and comprehensively problems influencing production in wood processing industry, health of people, conditions of natural environment and natural resources, reveals expertise of applying and optimizing special techniques as adapted for wood science	WS2A_S05
	O7 has skills for selecting and modifying typical actions in wood technology with a use of right techniques in order to enable improving quality of life of people together with rational utilization of natural resources	WS2A_S06
	O8 is able to assess usefulness of typical methods and tools for solving simple, practical engineering tasks which are typical of wood technology and then select and apply proper methods and tools	WS2A_S12
Social skills	O9 understands the need for continuous learning, is able to inspire and organize learning processes of other persons	WS2A_C01
	O10 is able to cooperate and work in a team, both as a leader and a member of a team	WS2A_C02
	O11 is able to establish proper priorities connected with solving tasks being defined by a student or others	WS2A_C03

Methods of evaluation of learning outcomes Exam, partial exam, training protocols Project and discussions	Symbols of course learning outcomes O1, O2, O3, O4, O5, O6, O7, O8, O9, O10, O11

TEACHING CONTENTS

TEACHING CONTENT

Lectures:

1. Behavior of constructional timber at high temperature heating and fire
   - 1.1. Specificity of structure and properties of timber species
   - 1.2. Pyrolysis and thermal oxidative decomposition of timber
   - 1.3. Ignition of timber
   - 1.4. Heat release characteristics and combustion heat of timber
   - 1.5. Flame propagation on timber surface
   - 1.6. Generation of smoke and toxic products at fire of timber
2. Fire protection of timber building structures and constructions
   - 2.1. Novel fire-retardant impregnation compositions for treatment of timber products
   - 2.2. Charring parameters of timber species with fire-retardant treatment at standard fire regime
   - 2.3. Fire protection properties of novel intumescent coatings for constructional timber
   - 2.4. Method of oxidative modification of plant raw material and some physicochemical characteristics of the product
   - 2.5. Environmental aspects and legal protection of wood against fire

Practical classes:

1. Projects of fire retardant preservation system.
2. The experimental studies of pyrolysis, ignition, heat release, flame spread, and generation of smoke and toxic combustion products of various timber species.
3. Laboratory testing: Oxygen index, Mass loss calorimeter, Mini Fire tube, charring rate.
4. Process of biodegradation of timber constructions and the efficiency of a new bio-moisture fire-protective composition.
5. Analysis of results and knowledge verification.

The course completion methods and criteria	Percentage of a final grade
Final test	100%

LITERATURE REFERENCE

1. B. Meacham, B. Poole, J. Echeverria, R. Cheng (auth.)-Fire Safety Challenges of Green Buildings.-Springer-Verlag New York (2012)
2. Horrocks, A.R. and Price, A.R.H.D - Fire Retardant Materials - Woodhead Pub Limited (2001).
3. : SFPE Handbook of Fire Protection Engineering. Third Edition. Published by the National Fire Protection Association Quincy, Massachusetts 2002
4. M. Le Bras: Fire retardancy of polymers - The use of intumescence-Woodhead Publishing (1998)
5. Aseeva R., Serkov B., Sivenkov A. (2014): Fire Behavior and Fire Protection in Timber Buildings. Springer Series in Wood Science, Springer, Netherlands.
6. Bulian F., Graystone J. (2009): Industrial Wood Coatings: Theory and Practice. Elsevier BV.
7. Camino G. and Lomakin S. (2001): Fire retardant materials. A.R. Horrocks and D. Price (eds.), Woodhead Publ. Ltd., Cambridge, UK.
8. Dinwoodie J.M., OBE, Building Research Establishment, and Honorary Professor, University of Wales (2002): Timber: Its nature and behavior. CRC Press.
9. Hull T.R., Kandola B.K. (eds.)(2009): Fire Retardancy of Polymers: New Strategies and Mechanisms. Royal Society of Chemistry, Cambridge, UK.
10. Richardson B. A., Consulting and Research Scientist, Director (2003): Wood Preservation, Second edition. Penarth Research International Limited, Taylor and Francis Group.
11. Tracton A.A. (ed.) (2007): Coatings materials and surface coatings. Taylor and Francis Group.
12. Weil E.D. and Levchik S.V. (2009): Flame Retardants for Plastics and Textiles
13. Practical Applications. Carl Hanser Verlag GmbH & Co. KG.
14. White R.H., Nordheim E.V. (1992): Charring rate of wood for ASTM E 119 exposure. Fire Technology, Vol. 28, Issue 1, pp. 5-30.
15. Pofit-Szczepańska M., Jaskółowski W., Mazela B. (2014): Palność drewna i wyrobów lignocelulozowych. Teoretyczne podstawy mechanizmów rozkładu termicznego, sposobów spalania się, modyfikacji przeciwogniowych oraz europejskich wymagań klasyfikacji pożarowej. Fundacja Edukacja i Technika Ratownictwa, Warszawa 2014.

Poznań, 22.02.2021