COURSE OUTLINE

PROPERTIES AND APPLICATIONS OF INNOVATIVE WOOD PRODUCTS WITH HIGH ADDED VALUE

(1) GENERAL

SCHOOL	TECHNOLOGY		
DEPARTMENT	FORESTRY, WOOD SCIENCES & DESIGN		
LEVEL	POSTGRADUATE		
COURSE CODE	**MB128**	**SEMESTER**	**2nd**
COURSE TITLE	PROPERTIES AND APPLICATIONS OF INNOVATIVE WOOD PRODUCTS WITH HIGH ADDED VALUE		

ACTIVITIES	**WEEKLY HOURS**	**ECTS**
Lectures	2	6
TOTAL	2	6

TYPE OF COURSE	ELECTIVE
PREREQUISITES	NO
LANGUAGE OF TEACHING AND EXAMINATION	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO
WEBPAGE COURSE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The purpose of the course is to develop the technological and scientific background of the students in the properties of new and innovative products and mainly the possibilities of applying these products in various applications. Analysis of the advantages and disadvantages of these products in order to make the most of these products. At the same time, the production technology is analyzed so that there is the possibility of installing and providing technical support for a production unit of these products.
Solid wood products and composite welded products will be used as materials.
Upon completion of the course, the student should be able to know:
• The production technologies of the new products that will be taught. At the same time, he will know ways to utilize these products in various applications, replacing the old materials, giving new possibilities to the final products.
• The properties and advantages and disadvantages of all new products according to their production method, as well as the cost of each product, so that they can judge where they can use them to provide solutions to various problems where solid wood but also composite welded products cannot respond satisfactorily.
• The application of various techniques to improve certain properties of existing materials.
• The energy utilization of some materials producing additional profits for production or processing units.

General Skills

(3) COURSE CONTENT

The course content is as follows:

- In the theoretical part of the course the student is taught the new materials that have recently appeared. The first product presented is the solid wood obtained after chemical manipulation with various substances that mainly improve the hygroscopicity of the final product. The following are the products that have undergone heat treatment and a description of their properties. Then the surfaces that use cell paper, in order to present a large thickness but on the other hand to have a very low density. This material is now the basic raw material for the manufacture of more than 30% of the furniture in Europe, while in the Greek area, due to the particularities of their connections, it is hardly used at all.
- Following is the presentation of products used in modern construction with the dominant material CLT (Cross Laminate Timber) which helps in the rapid reconstruction of multi-storey houses. In addition to the production technology, connection methods are also being developed, as well as ways to calculate the load that the material can carry each time.
- The next product presented is the beams reinforced with carbon fibers, products used in specialized constructions, such as the restoration and maintenance of historical buildings, a branch with a long future in the Greek territory with so many monuments.
- Another new product that presents very good properties for structural use is Dentrolight with a special production line that also provides many solutions where no other material can.
- Another large section that will be developed is the use of various nanocomposites to improve the properties of the surfaces of various products. Such preparations are the oxides of zinc and titanium, for which the method of production and application will be analyzed.
- Finally, the relationship between wood and energy will be analyzed in depth so that the use of wood through new materials of high energy efficiency becomes understandable and easy to implement.

From the 1st lesson, a suggested list of assignments is given that the student should undertake and prepare (individually) until the end of the MSc semester.

The relevant directions are given, while rich material and instructions will be posted in the E-class.

The final assignment includes, in addition to paper and electronic submission, a public oral presentation on the chosen topic, on a set date (usually the 12th or 13th week of classes). The presentation lasts 15 minutes and is followed by 5 minutes of questions from the students present. The teacher intervenes - if necessary - for comments, observations, corrections.

Students are graded on the overall performance of their final paper: 70% on the content and editorial specifications and 30% on the preparation of the online presentation and its oral support.

These grades count for a total of 40% of the overall grade that students will receive after the final written theory exam.

(4) TEACHING AND LEARNING METHODS - EVALUATION

<table>
<tr><td>COURSE DELIVERY METHOD</td><td>In class and remotely</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td>• Use H/Y, ppt slides, projector
• Learning process support through the e-class electronic platform</td></tr>
<tr><td>MANAGEMENT OF TEACHING</td><td>
<table>
<tr><th>Activity</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Individual work on the properties and applications of innovative high value-added wood products</td><td>44</td></tr>
<tr><td>Educational excursion / Small individual practice tasks</td><td>20</td></tr>
<tr><td>Independent Study</td><td>60</td></tr>
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<tr><td>Course Total (25 workload hours per credit unit)</td><td>150</td></tr>
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<tr><td>STUDENT EVALUATION</td><td>I. Written final exam (60%) including:
- Short answer questions from all the material in the book
- Solving exercises related to the subject of the course
II. Presentation of Individual Work (40%).</td></tr>
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(5) RECOMMENDED-BIBLIOGRAPHY

- Suggested Bibliography:

- APA. 2002. Engineered Handbook. APA Tacoma Washington
- Carraher C. 2014. Carraher's polymer chemistry. Boca Raton: Taylor & Francis. p. 232. ISBN 1466552034.
- Clemons C. 2002. Wood-plastic Composites in the United States: The interfacing of two Industries. Forest Products Journal, 52(6).
- EconCore.com. 2007. Sandwich Panel Technology.
- Ehart R., S. Stanzl-Tchegg and E. Tschegg. 1999. Mode III fracture energy of wood composites in comparison to solid wood. Wood Science and Technology, 33:391-405.
- Gibson S. 2008. Synthetic Decking. Remodeling Magazine.
- Hamel S. 2011. Modeling the Time-dependent Flexural Response of Wood-plastic Composite Materials Dissertation, University of Wisconsin–Madison.
- Knudson R. 1992. PSL 300 LSL:The challenge of a new Product. Proceedings 26th International Particleboard/Composite Materials Symposium W.S.U. 1992:206-214.
- Lee S. 1991. Wood laminates. In: International Encyclopedia of Composites, 6:97-110.
- Mc Natt D., W. Galligan and G. Hans. 1982. Forest products for Building costruction. Wood and fiber science. April 1984. V 16(2).
- Morrell J. et al. 2006. Durability of wood-plastic composites. Wood Design Focus 16(3).

- Ntalos G., F. Pichelin, W. Haelvoet, S. Tobish, A. Teischinger and A. Grigoriou. 2000. Materials for wood based panels. Today and Future in glued wood products. State of the art report. Workshop Espoo Finland 4-5 May 2000.
- Pease D. 1994. Panels Products Applications and Production Trends. Wood Technology, Miller Freeman Inc. Renolit.com. 2007. WPC honeycomb panel".
- Solvay 2014. What are Ultra Polymers?
- Stark N. 2001. Influence of Moisture Absorption on Mechanical Properties of Wood Flour-Polypropylene Composites. Journal of Thermoplastic Composite Materials, 14 Trex Company Reminds Consumers of Replacement Program for Defective Decking Manufactured between 2002 and 2007 for Sale in the Western United States.
- Willis D. 1997. New life for Scriber. Report of Division of Forest products USA. 76.
- Zylkowsi S. 2000. Engineered wood products in North America. Presentation to Cost Action E13 International Workshop on Wood.

- Related Scientific Journals:

• Forest Products Journal (AmericanForest Products Society) http://www.forestprod.org/fpjover.html)

• Holz als Roh- und Werkstoff (http://www.springerlink.com/content/1436-736X/)

• Holzforschung - International Journal of the Biology, Chemistry, Physics, and Technology of Wood (http://www.degruyter.de/rs/272_3108_ENU_h.htm)

• Journal of Wood Science (Japan Wood Research Society http://www.springerlink.com/content/1611-4663/)

• TAPPI Journal (http://www.tappi.org/s_tappi/sec_publications.asp?CID=9000&DID=551877 (Paper360°))

• Timber Harvesting (America's Only National Logging & Forestry Magazine) http://www.timberharvesting.com/

• Timber Processing: Lumber, Composites, Engineered Products (http://www.timberprocessing.com/)

• Wood and Fiber Science (Society of Wood Science and Technology: http://www.swst.org/journal.html)

• Wood Based Panels International (http://www.wbpionline.com/)

• Wood Science and Technology (http://www.springerlink.com/content/1432-5225/)