

COURSE OUTLINE

(1) GENERAL

SCHOOL	TECHNOLOGY		
DEPARTMENT	FORESTRY, WOOD SCIENCES & DESIGN		
LEVEL	POSTGRADUATE		
COURSE CODE	M111	SEMESTER	1st
COURSE TITLE	INNOVATIVE WOOD PRODUCTS		
ACTIVITIES		WEEKLY HOURS	ECTS
Lectures		2	5
TOTAL		2	5
TYPE OF COURSE	OBLIGATORY		
PREREQUISITES:	NO		
LANGUAGE TEACHING AND EXAMINATION:	GREEK		
THE COURSE OFFERED TO STUDENTS ERASMUS	NO		
WEBPAGES COURSE (URL)	https://eclass.uth.gr/courses/FWSD_P_101/		

(2) LEARNING OUTCOMES

Learning Outcomes
<p>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.</p> <p>Upon completion of the course, the student should be able to know:</p> <ul style="list-style-type: none"> • 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 finished 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 which they can use to provide a solution to various problems that solid wood and composite welded products cannot satisfy. • To apply the various techniques in order to improve certain properties of the existing materials. • To utilize energy from some materials producing additional profits for some production or processing units.
General Skills

(3) COURSE CONTENT

The theoretical course takes place three (3) hours a week and is conducted using PCs, ppt slides, projector.
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The course content is as follows:

The content of the theoretical part of the course includes the following:

In the theoretical part of the course the Student is now taught new materials that have recently appeared.

The first product presented is the surfaces that use cell paper in order to present a large thickness but on the other hand have a very low density. This material is now the basic raw material for the construction of more than 30% of the furniture in Europe, while in Greece, due to the particularities of their connections, it is hardly used at all.

The 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 and methods of calculating the load that the material can carry each time are also being developed.

The next product you present are beams reinforced with carbon fibers, products used in specialized constructions such as the restoration and maintenance of historic buildings, a branch with a long future in the Greek territory with the many monuments it has.

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 which will be analyzed the way of production and application of these preparations.

Finally, the relationship between wood and energy will be analyzed in depth so that it becomes understandable and easy to implement the use of wood through new materials of high energy efficiency.

- **Course update. Introduction to new requirements and new materials:** The needs that have been created in the market and the need to use new materials.
- **Surfaces with low density using cell paper:** The trends that appeared in Europe for light and portable furniture and the use of thick and low-density foam surfaces. Properties and particularities of these products.
- **CLT Cross laminate timber:** The new material in modern reconstruction. Properties and modes of connection.
- **Carbon fiber reinforced beams:** Modern materials for specialized uses such as the maintenance and restoration of historical monuments that have special requirements.
- **Dentrolight:** Innovative material that can provide a solution where other materials hardly can.
- **Reinforcement of surfaces for greater resistance to moisture and UV radiation:** Problems present in applications with high humidity, pollution or exposure to solar radiation. The need for protection and ways to use different techniques.
- **Applications of Titanium and Zinc Oxides:** Preparation and application of oxides as well as measurement of the properties they impart
- **Nanofoms – Nanotechnology:** New wood waterproofing technologies using nanocomposites on the wood surface
- **Two-day educational visit to 2 businesses selling new products in Attica.**
- **Wood and energy:** Another dimension in the use of wood for thermal energy production. A way to utilize production residues and increase business revenue
- **New wood materials with high energy efficiency:** Presentation of new products appearing on the market with a mixture of wood and lignite or charcoal
- **Production technology of wood energy products:** Pyrolysis of wood techniques and applications.
- **Case-by-case application examples of all materials:** Exercises in the application of the various materials with scenarios for an optimal understanding of the properties of each material

The learning process is supported through the e-class electronic platform.

Speakers relevant to the subject of the course are invited from time to time.

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

The relevant directions are given, while rich material and instructions will be posted on 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

COURSE DELIVERY METHOD	In class and remotely	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	<ul style="list-style-type: none"> • Use of PC, ppt slides, projector • Learning process support through the e-class electronic platform 	
MANAGEMENT OF TEACHING	Activity	Semester Workload
	Lectures	26
	Small individual practice tasks	20
	Final work	60
	Independent study	44
	Total Course	150
STUDENT EVALUATION	<p>I. Written final exam (60%) which includes:</p> <ul style="list-style-type: none"> • Short answer questions from all the material in the book • Solving exercises related to the subject of the course <p>II. Presentation of work (40%).</p>	

(5) RECOMMENDED-BIBLIOGRAPHY

<p>- Suggested Bibliography:</p> <p>APA . Engineered Handbook , 2002. APA Tacoma Washington</p> <p>Ehart, R., Stanzl-Tchegg, S., Tschegg, E. 1999. Mode III fracture energy of wood composites in comparison to solid wood. Wood science and Technology 33. pp 391-405</p> <p>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.</p> <p>Lee, S. 1991. Wood laminates . In: International Encyclopedia of Composites Vol.6:97-110.</p> <p>Mc Natt, D., Galligan, W. , Hans, G. 1982. Forest products for Building construction. Wood and fiber science . April 1984. V 16(2).</p> <p>Ntalos,G., Pichelin, F., Haelvoet, W. Tobish, S. Teischinger, A., Grigoriou A. 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.</p> <p>Pease, D. 1994. Panels Products Applications and Production Trends. Wood Technology, Miller Freeman Inc.</p> <p>Willis, D. 1997. New life for Scriber. Report of Division of Forest products USA. 76</p> <p>Zylkowsi, S. 2000. Engineered wood products in North America. Presentation to Cost Action E13 International Workshop on Wood</p> <p>http://wpc-composite-decking.blogspot.com/p/what-is-wood-plastic-composite-wpc.html</p>
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Clemons, C. (2002) "Wood-plastic Composites in the United States: The interfacing of two Industries" *Forest Products Journal* 52(6)
http://www.wpcextruder.com/news_show-13.html Introduction of WPC Wood Plastic Composite Products
http://www.ktron.com/industries_served/plastics/woodplastic.cfm

Stark, N. (2001) "Influence of Moisture Absorption on Mechanical Properties of Wood Flour-Polypropylene Composites." *Journal of Thermoplastic Composite Materials* 14

Gibson, Scott (2008). "Synthetic Decking" . Remodeling Magazine.
 "What are Ultra Polymers?". Solvay. 2014. Retrieved 2014-04-17.

Carraher, Charles (2014). *Carraher's polymer chemistry*. Boca Raton: Taylor & Francis. p. 232. ISBN 1466552034.

Hamel, S. (2011) *Modeling the Time-dependent Flexural Response of Wood-plastic Composite Materials* Dissertation, University of Wisconsin–Madison

Morrell, J et al.(2006) "Durability of wood-plastic composites." *Wood Design Focus* 16(3)
<http://www.decksandfencesbyryan.com/articles/21-composite-vs-wood.html>

Trex Company Reminds Consumers of Replacement Program for Defective Decking Manufactured between 2002 and 2007 for Sale in the Western United States"
 "WPC honeycomb panels". Renolit.com. Retrieved 2014-10-07.
 "Sandwich Panel Technology". EconCore.com. Retrieved 2014-10-07.
<http://fencedeck.ca/decks/mississauga-composite-deck/>
http://wpcinfo.org/techinfo/Fire_Studies.html Washington State University Wood Plastic Composites Information Center, "Fire Issues in Engineered Wood Composites for Naval Waterfront Facilities", 46th International SAMPE Symposium and Exhibition, Long Beach, California, May 2001
<http://www.enn.com/business/article/24261> Environmental News Network, "California Fire Codes Put Focus on Plastic Decking Concerns" 5 Nov 2007

- Related scientific journals:

The **Forest Products Journal** is a source of information for industry leaders, researchers, teachers, students, and everyone interested in today's forest products industry. It is published by the American [Forest Products Society](http://www.forestprod.org/fpiover.html): <http://www.forestprod.org/fpiover.html> (The complete color feature from each issue of the *Forest Products Journal* is available in PDF format and can be viewed and printed.)

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 is the official journal of the [Japan Wood Research Society](http://www.springerlink.com/content/1611-4663/):<http://www.springerlink.com/content/1611-4663/>

TAPPI is the leading association for the worldwide pulp, paper, packaging, and converting industries and co-publisher of **Paper360°** and the **TAPPI**

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

http://www.tappi.org/s_tappi/sec_publications.asp?CID=100&DID=120 (TAPPI Journal)

Timber Processing: Lumber, Composites, Engineered Products: <http://www.timberprocessing.com/>

Timber Harvesting: America's Only National Logging & Forestry Magazine:<http://www.timberharvesting.com/>

Wood and Fiber Science is the official publication of the [Society of Wood Science and Technology](http://www.swst.org/journal.html), and accordingly publishes papers with both professional and technical content. Original papers of professional concern, or based on research dealing with the science, processing, and manufacture of wood and composite products of wood or wood fiber origin will be considered:<http://www.swst.org/journal.html>

Wood Based Panels International, covers all the latest news from the UK and around the world, plus in-depth features on market and technical developments, individual businesses, personalities and industry opinion: <http://www.wbpionline.com/>

Wood Science and Technology: <http://www.springerlink.com/content/1432-5225/>