DETAILED COURSE DESCRIPTION
ERE 682 – Transport Processes

COURSE DEFINITION:
ERE 682 Shared Resource: WPE 326 Instructor: Dr. William B. Smith
course format: 2 hours lectures per week
3 hours laboratory per week
3 credit hours Spring semester
Pre- or co-requisite(s): WPE 387 or permission of instructor

SCOPE:
Level of Instruction:
Graduate level course for students in Construction Management and Wood Products Engineering and others interested in Environmental and Resource Engineering.

Content:
Major Concepts or Methodologies:
This course is designed to provide the student with knowledge and understanding of the critical relationships between wood and liquid moisture and water vapor, wood shrinkage and swelling. The flow of fluids, heat and water vapor are treated as analogous phenomena and are related to the cellular structure and anatomy of wood. The physical characteristics of density, permeability, and thermal conductivity are related to the industrial processes of wood drying and preservation treatments and fire retardancy. Laboratory studies in relative humidity measurement, wood-moisture relations, relationships between wood permeability and drying and treatability, industrial wood drying, dry kiln operation, and preservative treatments, and fire retardancy.

Relation to curriculum or to other ESF or Syracuse University courses:
This course is intended to provide beginning graduate students with subject matter in the field of transport processes in wood, including wood drying and associated wood defects, wood preservative treatments, fire retardant treatments, wood moisture, humidity, and shrinking and swelling relationships, wood permeability and thermal conductivity, and liquid and water vapor movement in wood. The undergraduate course, WPE 326, is not a prerequisite for this course, and a student may not enroll in or receive credit for the latter course and ERE 682.

OBJECTIVES:
After completing this course the student should be able to:
1. Demonstrate understanding of transport processes in wood including water-vapor movement, hydrodynamic flow, and heat flow, to explain the relationships of these processes to one another and to the anatomical structure of the wood
2. Understand and demonstrate knowledge of wood moisture, shrinkage and swelling relationships, temperature, relative humidity and psychrometrics, and measurement methods.
3. Understand the relationships between wood anatomy, density, porosity, permeability and thermal conductivity.
4. Demonstrate knowledge and skills as to the industrial practices of wood drying and preservative treatment, and to supplement the lecture with laboratory experimentation to illustrate the theoretical principles presented in the lecture.

INSTRUCTIONAL FORMAT AND MATERIALS:
Format: Two hours of lecture and three hours of laboratory per week. Assignments include readings and review of texts and journal articles, and regular homework problems. Laboratory exercises will include measurement and study of relative humidity, moisture content, shrinkage and swelling, permeability, wood drying and wood preservation methods.

Materials: Required and recommended texts and journal articles.

INSTITUTIONAL RESOURCES REQUIRED (INSTITUTIONAL IMPACT):
A classroom with a chalk or dry-erase board, overhead projector, slide projector, screen, multimedia projector, TV for video projection. The lab requires temperature and humidity conditioned rooms and chambers, wood and machining equipment for preparation of experimental material, wood vacuum and pressure impregnation equipment in the wood
HEALTH AND SAFETY CONSIDERATIONS:
Health and Safety Considerations to be Specifically Addressed.

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<th>Conditions or situations present in association with the course?</th>
<th>YES</th>
<th>NO</th>
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<td>1. Will substances with any of the following properties be used during instruction: flammability, toxicity, corrosivity, reactivity, registered pesticide, legally controlled, or other characteristics with the potential to cause harm or injury?</td>
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<td>2. Will any physical hazards be present during instruction? (e.g., machines that need safety guards; razor blades or syringes; compressed gases, etc.).</td>
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<td>3. Will any biological hazards be present during instruction? (e.g., handling animals (rabies or hantavirus); cultures or stocks of infectious agents (fungal spores, viruses, bacteria, etc.).)</td>
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<td>4. Will any radiation hazards be present during instruction? (e.g., radioisotopes, X-rays, ultraviolet rays, lasers, etc.).</td>
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<td>5. Will any electrical equipment that, due to its design, location, or method of use, pose any threat to safety during instruction? (Give considerable thought to electrical use outdoors, or any potentially wet location.).</td>
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<td>6. Will there be any personal safety issues related to the class? (e.g., due to time of day or location, at the end of any organized class exercise, will students be in danger of physical assault, etc.).</td>
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<td>7. Will any students be driving official State or research sponsored land or water vehicles during any class or instructional exercise?</td>
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<td>8. Will any type of personal protective equipment be necessary during class exercises? (e.g., hard-hats, eye/face protection, hearing protection, hand/foot protection, lab coat, visibility clothing, etc.)</td>
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Health and Safety Considerations Narrative: Eye, face, and hand protection will be utilized by the instructor and students when working with wood preservative chemicals and pressure impregnation equipment. Hardhats will be worn during industrial field trips.

CATALOG DESCRIPTION:
ERE 682 Transport Processes (3)
Two hours of lecture and three hours of laboratory.
Prerequisites: WPE 387 or permission of instructor.
Note: Credit will not be granted for both ERE 682 and WPE 326.

COURSE HISTORY:
This subject matter was taught previously under WPE 796, Advanced Topics. This description formalized the presentation of the course and placed it in the catalog where it was visible to prospective students. This revised description approved by Faculty Action 12/17/75 with the number WPE 626. By Faculty Action on 12/16/76 WPE 626 was renumbered as ERE 682.