WOOD-BASED COMPOSITE SCIENCE
SHORT COURSE SERIES

The Wood-Based Composite Science Short Course series, developed in partnership with the *Oregon Wood Innovation Center* and the *Wood-Based Composites Center*, provides mill operators as well as career professionals with a fundamental knowledge of wood as an engineering material in the manufacturing of wood-based composites.

Wood science and technology experts, selected from top universities, government research labs and industry, teach the course's seven modules.

Each module includes five to 10 hours of instruction. Participants who receive a 70-percent or above on the course final exam will receive a **Certificate of Completion**.

WBC members are **eligible for a 40%** discount. To receive the **discount code**, please contact the WBC at:

wbc.center@oregonstate.edu

- **Wood Structure**
- **Wood and Water Relationships**
- **Applied Statistics and Data Analysis**
- **Wood Adhesion Science and Technology**
- **Strand-based Composite Manufacturing**
- **Practical Wood Adhesives Technology**
- **Structural Plywood and Veneer Based Composite Manufacture**

Learn more at: *workspace.oregonstate.edu/certificate/wood-based-composite-science-short-course-series*

COURSE

WOOD STRUCTURE

Instructor:
FRED KAMKE

This Wood Structure course introduces the macro- and micro-structure of wood. It focuses on the practical implications of anatomical structure in the field of wood-based composites. Many wood species are discussed, but limited to species of commercial importance in North America. Examples include species that are commonly used in the manufacture of wood-based composites. Many photomicrographs and animations are used to illustrate concepts. Anatomical features of wood are discussed in relation to wood properties, such as density, permeability, and bending modulus.

Understanding how and why wood behaves the way that it does is critical for efficient processing, troubleshooting, and product performance. The Wood Structure course consists of:

1. **Introduction**
2. **Cell wall structure**
3. **Chemical composition**
4. **Softwood structure**
5. **Hardwood structure**
6. **Identification**
7. **Juvenile wood and reaction wood**
8. **Structure – property relationships**

Each lecture requires:
45-90 minutes

Approximate Time:
10 hours

Available during:
13-week period

$450

COURSE

WOOD AND WATER RELATIONSHIPS

Instructor:
SCOTT LEAVENGOOD

This **Wood and Water Relationships** course describes the interactions of wood and water and the effect on a number of properties – shrinking and swelling in particular. The course begins with lectures on gas behavior and humidity. This information serves as background for understanding interactions between temperature and humidity, and their impact on wood behavior. The information on wood and water relations is divided into two lectures.

The first lecture presents a review of wood structure, how wood holds water, how we calculate moisture content, why wood shrinks and swells, and how wood's moisture content changes with changes in temperature and humidity. The second lecture focuses on shrinking and swelling.

Solid wood is presented first followed by unique issues with composite wood products such as restraint due to cross-lamination, the impact of densification, and variability in density. The course also includes information on common methods and tools used for measuring moisture content.

1. **Introduction**
2. **How gases behave**
3. **Humidity**
4. **Wood and water relations A**
5. **Wood and water relations B**
6. **Measurement of moisture in wood**

Each lecture requires:
45 – 90 minutes
Approximate Time:
10 hours
Available during:
13-week period

$450

COURSE

APPLIED STATISTICS AND DATA ANALYSIS

Instructor:
WILLIAM BOEHNER

This Applied Statistics and Data Analysis course introduces students to applied statistics and data analysis with a focus on the practical implications of statistics in the field of wood-based composites. The course will prepare the student to collect and analyze data using basic statistical tools. Students will learn how to compute and interpret basic descriptive statistics such as mean and standard deviation. Students will also learn how to compare means from different samples using t-tests and ANOVA and how to interpret the results of those tests. Understanding how and why to collect data and analyze data is critical for quality control, troubleshooting, and product performance.

1. **Introduction**
2. **Sampling**
3. **Plotting**
4. **Basic statistics**
5. **Determining normality**
6. **t-tests**
7. **ANOVA**
8. **Distributions**

Each lecture requires:
45-90 minutes
Approximate Time:
10 hours
Available during:
13-week period

$450

COURSE

WOOD ADHESION SCIENCE AND TECHNOLOGY

Instructor:
CHIP FRAZIER

In this **Wood Adhesion Science and Technology course**, you'll receive an introduction to adhesion science and technology with an introduction to basic chemical concepts, surface chemistry, polymer science, polymer analysis, and also to some commercially significant wood adhesives and topics specific to those adhesives.

1. **Introduction to Adhesion**
2. **Chemical Introduction**
3. **Intermolecular Forces**
4. **Surface Chemistry**
5. **Organic Reactivity**
6. **Polymer Analysis**
7. **Polymer Science-I**
8. **Polymer Science-II**
9. **Theories of Adhesion**
10. **Adhesive Strength Development**
11. **Adhesives and Applications**
12. **Wood Factors that Impact Bonding**

Each lecture requires:
20 – 120 minutes
Approximate Time:
10 hours
Available during:
13-week period

$450

COURSE

STRAND-BASED COMPOSITE MANUFACTURING

Instructor:
WILLIAM BOEHNER

This Strand-based Composite Manufacturing course covers the manufacturing of strand-based composites (OSB and LSL) beginning in the forest and continuing through pressing as outlined below. Within each lecture, key variables that affect the quality of the intermediate product, such as a strand, as well as the finished panel product are identified and discussed. Results of scientific studies and a mill trial are presented to support conclusions.

1. **Introduction**
2. **Initial considerations – species and wood quality**
3. **Green end, Part 1 – trees, logs, and storage**
4. **Green end, Part 2 – log preparation, debarking, and stranding**
5. **Drying, screening, and conveying**
6. **Blending**
7. **Mat forming**
8. **Pressing**

Each lecture requires:
45-90 minutes
Approximate Time:
10 hours
Available during:
13-week period

$450

COURSE

PRACTICAL WOOD ADHESIVES TECHNOLOGY

Instructor:
BRUCE BROLINE

In this **Wood Adhesion Science and Technology course**, you'll receive an introduction to adhesion science and technology with an introduction to basic chemical concepts, surface chemistry, polymer science, polymer analysis, and also to some commercially significant wood adhesives and topics specific to those adhesives.

1. **Introduction to Adhesion**
2. **Chemical Introduction**
3. **Intermolecular Forces**
4. **Surface Chemistry**
5. **Organic Reactivity**
6. **Polymer Analysis**
7. **Polymer Science-I**
8. **Polymer Science-II**
9. **Theories of Adhesion**
10. **Adhesive Strength Development**
11. **Adhesives and Applications**
12. **Wood Factors that Impact Bonding**

Each lecture requires:
45 – 90 minutes
Approximate Time:
10 hours
Available during:
13-week period

$450

COURSE

STRUCTURAL PLYWOOD AND VENEER-BASED COMPOSITE MANUFACTURE

Instructor:
DICK BALDWIN

This Structural Plywood and Veneer-Based Composite Manufacture course describes the softwood plywood and veneer based industry and how this forest-based business functions to create a profitable enterprise.

Initially focusing upon the history and legacy of the industry, the course then provides pertinent knowledge which systematically explains each step in the manufacturing process. The course concludes with an explanation of how this knowledge is applied.

Real world examples and how-to descriptions are recurring; and a variety of visual aids will assist the learning process.

1. **Introduction**
2. **Industry History & Legacy**
3. **Raw Material Yield Management**
4. **Green Veneer Manufacturing Part 1**
5. **Green Veneer Manufacturing- Part 2**
6. **Veneer Drying and Preparation**
7. **Assembly Systems and Bonding**
8. **Downstream Value Adding Processes**
9. **Matching the Mill to the Market**

Each lecture requires:
45-90 minutes
Approximate Time:
10 hours
Available during:
13-week period

$500