WOOD SCIENCE & ENGINEERING

2014-15 GRADUATE HANDBOOK

PREFACE

The Department of Wood Science & Engineering at Oregon State University is a multidisciplinary science, technology and business program that is committed to excellence in education and research to extend available forest resources to meet society's growing need for forest products while maximizing their value. We view research and the education of future scientists, technologists and other professionals as being of paramount importance in meeting the challenges of the future.

The MS and PhD degrees in Wood Science are intended for those likely to enter careers as research and development scientists, marketing consultants, professors, structural engineers, industry technologists and managers, or other highly skilled professionals. These degrees are strongly connected to a program of research or problem solving and emphasize oral and written communication skills.

This booklet is designed for both prospective and current graduate students in Wood Science. It was developed to acquaint you with some of the opportunities with our degree programs and is a compilation of our rules, procedures, and guidelines associated with applying for admission and successful completion of a degree. If you have questions that are not covered in this booklet, please give us a call or send an e-mail to the address below.

Laurence Schimleck
Professor and Department Head
Department of Wood Science & Engineering
Oregon State University
119 Richardson Hall
Corvallis, OR 97331-5751
Tel.#: 541-737-4257
Fax#: 541-737-3385
E-mail: woodscience@oregonstate.edu
Web: http://woodscience.oregonstate.edu/

WHY A GRADUATE DEGREE IN WOOD SCIENCE?

Pacific Northwest forests are an integral part of the economic and social development of this nation and the world. The demand for wood-based products is expanding with a growing population and rising global standard of living. This increased demand comes at a time when the quality and quantity of our wood supply are changing and when there is increasing interest in the sustainability of forests and surrounding communities. These pressures demand new products and materials to compensate for changing resources and markets, new technologies to improve processing efficiency, and a recommitment to stewardship in our use of forest-based renewable resources.

We will have to be smarter in making and using products from renewable resources to meet consumer demand and to minimize environmental impacts. Consequently the demand for professionals knowledgeable about forest products or wood science and technology outstrips the supply at the present time and for the foreseeable future.

The field of wood science and technology is relatively young, having evolved primarily since the 1940's. Engineering, product design, manufacturing, marketing and fundamental research on wood as an industrial material were done by engineers, chemists, botanists, MBAs, foresters, and others who devoted their careers to working with wood. Greater sophistication and knowledge led to the development of scientists and technologists who had specific training in wood as a material as well as solid foundations in business, science, and engineering. These specialists find employment in all aspects of manufacturing and utilization of forest products from the raw material to the ultimate use by the consumer.

Wood science is the interdisciplinary body of knowledge about wood as a material, including its origin, properties and characteristics. Wood technology deals with the application of knowledge in the conversion, processing, marketing and use of wood and wood-based materials. In recent years the field of wood science has expanded to include a range of composite and nontraditional products. Advanced wood-based composites have become a model for other modern bio-based composites.

The Pacific Northwest forest products industry is very much in transition and will continue to be an extremely important segment of the state’s economy. Over 40 percent of Oregon’s forest land supports an industry that accounts for one quarter of the total manufacturing sector of the State’s economy.

As the industry moves from being labor-intensive to more knowledge-intensive, the programs of this department increase in importance. Improved efficiency, new products and markets, competitiveness, value-added secondary manufacturing, alternative raw materials, and nontraditional resources are all important initiatives that require science-based evaluation and support to succeed. These new challenges offer exciting opportunities for wood science at OSU and in Oregon.

JOB OPPORTUNITIES: Our graduates are actively sought by private companies, global corporations, government agencies, universities and others. Examples of recent jobs include:

- **Design Engineer**, Oregon, New York, California
- **Product Development Engineer**, Australia
- **Project Manager**, Massachusetts
- **Market Researcher**, Washington, Canada
- **Chemist**, Oregon, California
- **Adhesives Technologist**, Oregon, Texas
- **Image Processing Engineer**, California
- **Consulting Wood Technologist**, New York
- **Research Engineer**, Idaho, North Carolina
- **Research Associate**, Michigan, Massachusetts, Virginia
- **Research Scientist**, Canada, Japan, Philippines
- **Technical Representative**, Louisiana
- **Software Engineer**, Systems Analyst, Oregon, California
- **Faculty Member**, Minnesota, Brazil, Chile, Montana, Oregon, Washington, Tennessee and elsewhere
- **Research and Development Scientist**, Oregon, Georgia
- **Technical Sales**, Oregon

ABOUT THE DEPARTMENT

The Department of Wood Science & Engineering at Oregon State University is one of the largest comprehensive wood science and technology programs in North America. The Department's faculty are active in all aspects of the Land Grant university mission: teaching, research and extended education (please see our Faculty section at the end of this booklet). Research and graduate education are the largest part of their activity, but no less important is undergraduate instruction leading to a Bachelor of Science degree in Renewable Materials or a minor in Renewable Materials for other undergraduate majors. Our undergraduate program is accredited by the Society of Wood Science and Technology.

MISSION STATEMENT

Our mission is to advance science, engineering, and business to help society use renewable wood and related materials and products in an environmentally sound and sustainable manner. We will enable Oregonians and the wood industry to be successful in a globally competitive environment through our teaching, research, and outreach programs.

FACILITIES

The Wood Science & Engineering Department occupies over 50,000 square feet of laboratory, classroom and office space in Richardson Hall, Peavy Hall, and in the former Forest Research Laboratory (FRL). Graduate students are generally assigned office space in Richardson Hall.

INFORMATION SERVICES CENTER

The Wood Science & Engineering Information Services Center is located in Richardson Hall and is available to all students and faculty. The College of Forestry research support services, such as the carpentry and machine shops are located in the FRL. The Forestry Communications office is located in Peavy Hall and provides services such as editing student and faculty co-authored manuscripts. Courses are taught in both Richardson and Peavy Halls which house excellent classrooms and computer facilities. The College provides ample and well-equipped computer laboratories as well as excellent network services which include a full-time computer helpdesk. A learning resource center and communications laboratory, available to all students, is located in Peavy Hall. Our continuing education program is greatly facilitated by electronic teaching facilities.

CURRENT RESEARCH PROGRAM AREAS

- Composite Materials Science
- Wood Anatomy & Quality
- Forest Products Marketing
- Innovation Management
- Process Modeling & Analysis
- Transport Processes in Wood
- Wood & Adhesives Chemistry

- Wood Drying & Moisture Relations
- Timber Engineering and Structural Design
- Scanning Technology/Computer-Aided Processing
- Biodegradation and Wood Preservation

OUR GRADUATE PROGRAMS

The Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees are offered with emphasis in a variety of subject areas. We participate in the Master of Science in Materials Science and in the Master of Arts in Interdisciplinary Studies (MAIS) program.

Beyond core course requirements each student has the flexibility to design a curriculum that achieves a desired blend of theory and practice in one or more specialties. All of our degree programs include coursework in other departments of the University. Thesis research typically draws from these related departments with their faculty serving on the graduate advisory committees of Wood Science students. Minors are most commonly selected from disciplines such as Statistics, Engineering, Chemistry, and Business.

Our educational programs are continually reviewed to keep them abreast of new developments in the field, new needs of students, and new desires of potential employers. We have a very active and expanding extended education program that annually conducts many short courses, workshops and symposia in wood drying, plywood manufacturing, lumber quality control, selling, and other topics. These courses also offer students an opportunity to participate and interact with professors and industry personnel.

DUAL MAJORS

Students may pursue a dual major in Wood Science and another field for either the M.S. or Ph.D. degrees. Only one degree is granted, but both majors are noted on the student's transcript. Many students find that this added value opens additional doors for employment. Successful students must complete all requirements for both degrees. Many Wood Science graduate students have successfully completed dual or concurrent degrees in Civil Engineering, Statistics, Mechanical Engineering, Forest Science, and Economics.

PARTNERSHIPS

The Department has key partnerships with the departments of Forest Engineering, Resource & Management, Forest Ecosystems and Society, Statistics, Botany & Plant Pathology, as well as Civil, Chemical, Biological, and Ecological Engineering in addition to Industrial and Mechanical Engineering and the College of Business. We also have close working relationships with users and producers of forest products who provide program relevance and unique research opportunities as well as financial support. Because Oregon's forest industry is one of the largest in North America we are able to provide unique research and education opportunities not found elsewhere.

FINANCIAL SUPPORT

The Department is supported from a variety of sources. Major sources of State funds are through the Oregon Forest Research Laboratory and a tax on the harvest of timber. Contracts

and grants from public and private sources are a major form of support for our research and graduate education programs.

REQUIRED BACKGROUND FOR A GRADUATE STUDENT IN WOOD SCIENCE

- *Bachelor's degree from accredited four-year program with a strong background in science, engineering, business, and mathematics.*
- *A scholastic record or background indicating a potential for success with graduate work.*
- *Entering students come from a wide range of backgrounds, such as:*
    - Agricultural Engineering
    - Biology
    - Botany
    - Business
    - Chemical Engineering
    - Chemistry / Biochemistry
    - Civil Engineering
    - Computer Science
    - Forest Products
    - Forest Science
    - Forestry
    - Industrial Engineering
    - Mechanical Engineering
    - Microbiology
    - Physics
    - Plant Pathology
    - Polymer Science
    - Pulp and Paper
    - Statistics/Mathematics
    - Wood Science and Technology

ABOUT OREGON STATE UNIVERSITY

Oregon State University is the Land, Sea, Space, and Sun Grant University in the state of Oregon and home to more than 21,800 undergraduates, nearly 4,000 graduate students, and over 3,400 faculty representing 100 countries and every state in the United States. Not only are we the leading public research university in the state, but we are also one of the leading research institutions in the country with $263 million in external funding for the 2013 fiscal year, supporting programs in 12 colleges.

OSU is located in Corvallis, Oregon, a small city of 55,000 that retains the friendliness and convenience of a small town. Corvallis is located near the center of the beautiful Willamette Valley, and lives up to its Latin name which means "heart of the valley". Near the banks of the Willamette River, a vital, multi-purpose waterway replete with natural beauty and abundant wildlife, Corvallis is one of the state's leading centers of commerce, culture and education.

Major employers such as Hewlett-Packard and CH2M Hill add to the breadth of the university community. Situated 80 miles south of Portland and 40 miles north of Eugene, Corvallis enjoys a mild climate year-round.

With the Coastal Range to the west and the Cascade Mountains to the east, all surrounding areas abound with outdoor sports and leisure activities such as white-water rafting, alpine and Nordic skiing, mountain biking, fishing, and hunting. There are streams, rivers, mountain lakes, snowcapped peaks, golf courses, and hiking trails. Natural and wilderness areas, wildlife refuges, and public forests are within easy reach of Corvallis. Adjacent to the city boundary is the 11,000 acre McDonald-Dunn Research Forest that supports the mission of the College of Forestry and offers ample recreational opportunities as well.

FOREST RESEARCH LABORATORY

The College of Forestry is one of the premier natural resource science institutions in the country with over 100 faculty, and is dedicated to increasing scientific understanding of forest resources. The College is closely allied with research units in the Bureau of Land Management, US Forest Service PNW Research Station, Environmental Research Laboratory of the EPA, National Biological Service, and a Long-Term Ecological Research (LTER) site. The College of Forestry has six research forests spread throughout the state that are used for demonstrations, research, education, and revenue generation. The 11,000 acres in the McDonald-Dunn Forest, within 20 minutes of the campus, are used extensively and are also a site for recreation. Collectively, these facilities and faculty comprise one of the largest forest research centers in the world.

The College's research program is conducted under the aegis of the Oregon Forest Research Laboratory (FRL), which is a statewide public service agency separate from, but closely linked with, OSU. The FRL Advisory Committee is appointed by the governor and represents the many diverse interests in Oregon's forests.

Undergraduate and graduate education is offered through the three departments in the college: Wood Science & Engineering, Forest Ecosystems and Society, and Forest Engineering, Resources and Management. The College's active continuing education program update public and private clientele on the latest technical findings that focus on management, extraction, manufacturing, and use of forest resources.

Applying for Graduate Admission

Deadlines

The deadline for a complete application is earlier in order to be considered for a College of Forestry Fellowship or a Graduate School Scholarship/Fellowship. In order to increase your chance of being considered for this type a funding, a complete application is required no later than December 17th, 2014.

The Department of Wood Science & Engineering follows the University deadlines outlined at: http://gradschool.oregonstate.edu/admissions/deadlines.

Domestic applicants: the deadline is 30 days prior to the term you wish to enroll.

International applicants: the deadline can vary based on whether or not you are currently in the U.S. on a visa.

Term	Begins	Deadline for applying from outside the U.S.	Deadline for applying from within the U.S.
Fall	September	April 1	June 1
Winter	January	July 1	September 1
Spring	March/April	October 1	December 1
Summer	June	January 1	March 1

While these are not hard deadlines, adherence as closely as possible to the deadlines should ensure adequate time for your application to be reviewed and a decision to be made.

Process

1. **Application:** Fill out and submit the Graduate School's application at http://infosu.oregonstate.edu/apply. Please select "Wood Science" under the Planned Course of Study section to ensure that we have access to your application & supporting materials. Failure to specify "Wood Science" as your program may result in payment of multiple application fees.

    a. **Statement of Objectives:** As part of the application you will have the opportunity to provide your statement of objectives; you may either choose to provide it when you apply, or you can wait to upload a PDF copy once your application has been processed.

    b. **Letters of Reference:** On the online application you will be able to supply the names and e-mail addresses of your references. Two (2) business days after you submit the application both you and your references will receive instructions on utilizing the online letter of recommendation system. Applicants with a Master's degree should include a letter of reference from their major professor.

c. **Transcripts:** The Graduate School will e-mail you after your application has been processed with instructions on how to upload documents to support your application.

   Please upload copies of all transcripts/academic records/degree statements from each undergraduate and graduate institution you have attended, including a copy of the grading key/explanation. Web printouts of transcripts are unacceptable and cannot be used for our evaluation.

   The Graduate School will contact you at the point of admission for official copies of your academic records.

d. **GRE Scores:** GRE scores are required of all applicants and must not be older than five (5) years. Please have your official scores sent electronically to OSU; the institution code is 4586 and the department code is 1003. You can upload copies of your score report for review during the admission process.

   Our program does not have a minimum required GRE score, however, scores are considered along with the applicant's overall academic and experience record. Strong scores can often be a deciding factor.

e. **TOEFL / IELTS Scores:** A valid TOEFL or IELTS score is required for all applicants whose native language is not English or for applicants who are not waived from English language testing. The scores must not be older than two (2) years by the time of matriculation. For the admission process you can upload copies of your score report for review.

   The department requires an iBT TOEFL score of 93 and for the IELTS a score of 7.0.

   For information on if you may qualify for a waiver from English language testing, please visit: http://gradschool.oregonstate.edu/admissions/international.

2. **Application Fee:** The application fee is $60 USD and must be paid by debit or credit card when submitting the application. The application fee is non-refundable.

3. **Upload Supporting Documents:** Approximately one (1) business day after you submit your application and payment the Graduate School will e-mail an OSU ID number to you with instructions on how to upload documents. Please upload documents to expedite review of your application.

4. **Ensure Your Application is Complete:** In order for Wood Science & Engineering to review an application, all of the following materials must be received:
   - Statement of Objectives
   - Three (3) Letters of Recommendation

- Copies of Transcripts/Academic Records/Degree Statements
- Copies of GRE Scores
- Copies of TOEFL/IELTS Scores

5. **Wood Science & Engineering Review:** The Wood Science & Engineering program will begin the application review process. The person(s) you have specified as a potential major professor will review your application, then the department's Graduate Admissions Committee, and then our department head. We will then notify the Graduate School of our recommendation and will send you an e-mail stating our recommendation.

   Successful applicants to the WSE program have a strong science, engineering or business background with evidence of good communication skills. Prior experience or training in wood science is not a prerequisite for admission in all study areas. Admission to the program is competitive depending on faculty interests, available space in the program, and financial resources. Some otherwise qualified applicants may not be accepted.

6. **Graduate School Review**: The Graduate School will review the application to ensure that your application meets their minimum qualifications, which are outlined at: http://gradschool.oregonstate.edu/admissions/academic-requirements.

   Once they have made their final decision they will send their official notification via e-mail.

Financial Assistance

Successful graduate applicants are usually considered for some form of financial assistance. Applicants who are sponsored by an outside agency may not qualify for consideration for all types of assistance.

College of Forestry Fellowships: These awards range from $500 to $7,000, are made to new and continuing graduate students, and are supplemental to other financial assistance, including a Graduate Research Assistantship (GRA).

New Applicants: You will need to have a complete application on file by December 17th, 2014 in order to be considered for a CoF Fellowship.

Continuing Students: You must apply for a CoF Fellowship by mid-February and will be selected in April.

Graduate School Administered Scholarships/Fellowships: The Graduate School administers several centralized graduate scholarship and fellowship programs. These funding opportunities require nomination by the department. New applicants and continuing students will be notified of potential opportunities and will be expected to participate in the application process.

More information on the scholarships and fellowships offered through the Graduate School are available at: http://gradschool.oregonstate.edu/awards.

Loans & Grants: The OSU Office of Financial Aid and Scholarships administers student loans and grants. You can obtain more information by visiting their website at: http://financialaid.oregonstate.edu.

Student Employment: Career Services can help you locate part-time, student hourly wage work on and off campus; for information on their services visit: http://oregonstate.edu/career.

Graduate Research Assistantships (GRAs)

A Graduate Research Assistantship (GRA) is a stipend paid for specific research or other duties. GRA duties are usually associated with a faculty research project and are supervised by a faculty member. Work assigned for the GRA is separate from that required for coursework, but work on a student's thesis or dissertation may be assigned. GRA work hours are usually flexible and will vary with the appointment level and expectations of the supervisor. For example, a 0.49 FTE (full-time equivalent) position requires an average of 20 hours work per week. However, the actual time worked each week will vary and it is common for a GRA to work fewer hours during the academic year and more hours when not attending classes. Some GRAs may become members of a labor union bargaining unit if part of their assignment is devoted to service to OSU as an employee.

All GRA appointments that are at least 0.20 FTE and above include tuition remission.

GRA Appointments: GRA appointments are either offered on a 9-month basis, 12-month basis, or on a term-to-term basis. They are typically offered from 0.20 FTE to 0.49 FTE. The starting dates for appointments are October 1, January 1, April 1, or July 1.

Renewals of these appointments are contingent upon:

1. Satisfactory performance of assigned duties.
2. Reasonable progress toward completing degree requirements.
3. Availability of funds.

Most M.S. students in the Department of Wood Science & Engineering receive financial support for up to two years and most Ph.D. students receive support for up to three years.

Full-Time Registration Requirements

In order to receive their stipend GRAs are required to register for a full-time load of classes each term they hold an assistantship. For fall, winter, & spring terms 12 credits is considered full time, however, the department strongly encourages students to register for the maximum of 16 credits during these terms. For summer term 9 credits is considered full time.

Benefits: GRAs with a 0.20 FTE appointment or greater must enroll in a mandatory health insurance plan. The University will contribute $330 per term toward the cost of this insurance and $15.00 toward administrative fees, but any additional costs for premiums or administrative fees will be deducted, pre-tax, from the GRA's paycheck. Some students may qualify for a waiver. More information about the health insurance plan, waiver requirements and forms may be found at the following website: http://studenthealth.oregonstate.edu/insurance/grad/. The University also provides a $110.00 Recruitment and Retention Differential each term to GRA's holding an assistantship of 0.20 FTE or greater. Since students are not eligible to accrue sick leave or vacation leave, they must make arrangements with their major professor for any time off, including periods when the university is not in session.

MAJOR PROFESSORS

Each graduate student is assigned a major professor who will serve as their principal program and thesis advisor. Typically the major professor is identified during the application process. Although the specific relationship between a major professor and student will vary, all major professors are expected to:

- Help students determine interests and choose the course work that best matches their needs
- Work with student and student graduate advising committee to see that all departmental and University requirements are met
- Provide specific suggestions on designing, carrying out and documenting thesis research, particularly at the MS level
- Provide guidance or mentoring on career and personal decisions that impact professional development

GRADUATE ADVISING COMMITTEE: The Graduate Advising Committee is principally responsible for ensuring that the student meets the requirements for the degree sought. As such, it maintains the standards of the Department, College and University. The committee also advises the student with respect to the study program. Individual members often provide guidance and advice on specific elements of the thesis research. All members ensure that a sound research plan is proposed.

Dual Majors: Dual major students typically have one Graduate Advising Committee for both majors. Faculty from each program serve as co-chairs of the committee and one or both may function as the major professor. The Wood Science Major Professor is the best source of information on these programs.

GRADUATE-LEVEL COURSES IN WOOD SCIENCE & ENGINEERING

WSE 501 RESEARCH AND SCHOLARSHIP (1-16 credits)
WSE 503 THESIS (1-16 credits)
WSE 505 READING AND CONFERENCE (1-16 credits)
WSE 506 PROJECTS (1-16 credits)
WSE 507 SEMINAR Section 1: Beginning Seminar (1 credit)
Section 2: Graduate Seminar (1 credit)

WSE 515 RENEWABLE MATERIALS IN THE MODERN AGE (3 credits)
Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning. *CROSSLISTED as DHE 515.*

WSE 520 THE GLOBAL CONTEXT OF THE FOREST SECTOR (3 credits)
Provides a broad knowledge base of business and marketing practices in the global forest industry. Includes a module on research ethics that fulfills OSU Graduate School requirements.

WSE 521 WOOD SCIENCE I (4 credits)
A comprehensive overview and integration of wood anatomy, wood physics, wood chemistry and wood mechanics; global contemporary issues impacting the wood and fiber sector; integration of basic wood sciences to understand the complex relationships between environment and wood material properties, and the influence of both on the use of wood-based materials.

WSE 522 WOOD SCIENCE II (4 credits)
Continuation of the comprehensive overview and integration of wood and fiber anatomy, physics, chemistry, and mechanics; integration of basic wood science to understand relationships with wood and fiber properties and their impact on final use. Focus on biological, chemical and physical degradation of wood; adhesion; and physical and engineering properties of wood. *Lec/lab.*

WSE 530 POLYMER COMPOSITES (3 credits)
A comprehensive survey of the material and mechanical properties of polymer-based composite materials including failure mechanisms, interfacial and nanoscale effects, and transport and thermal properties. *PREREQS: CHE 545. Recommended: multivariable calculus.*

WSE 535 POLYMER SYNTHESIS AND STRUCTURE (3 credits)
A comprehensive overview of various synthetic methods for various synthetic polymers; structures of various synthetic and natural polymers. *PREREQS: 3 credits of undergraduate organic chemistry or CH 331 or CH 334 are recommended.*

WSE 553 GLOBAL TRADE IN RENEWABLE MATERIALS (3 credits)
Provides basic skills to operate in the global business environment. To include understanding the role of culture in international business, types of international business, policy considerations, ethics, trade barriers, exchange rates, shipping, global industry structure, and

other current issues. Examines specific examples from renewable materials industries. *PREREQS: ECON 201 and ECON 202 or instructor consent.*

WSE 555 MARKETING AND INNOVATION IN RENEWABLE MATERIALS (4 credits)
Marketing, innovation and their application in the renewable products industries.

WSE 558 WOOD DESIGN (4 credits)
Study of basic wood properties and design considerations. Design and behavior of wood connectors, beams, columns and beam columns. Introduction to plywood and glue laminated members. Analysis and design of structural diaphragms and shear walls. Lec/lab. *CROSSLISTED as CE 584. PREREQS: CE 383 or CE 481 with minimum grade of C, senior standing or graduate.*

WSE 561 MANUFACTURING WITH RENEWABLE MATERIALS I (4 credits)
Manufacturing renewable materials such a wood, bamboo, hemp, and cereal straws into products requires size reduction and separation of components. The components are then further processed, in many cases by joining with glue or fasteners, to create a usable product. The major processing steps for the conversion of raw materials into products will be discussed. *PREREQS: WSE 210 and WSE 321 and WSE 324*

WSE 562 MANUFACTURING WITH RENEWABLE MATERIALS II (4 credits)
The second of a two-term series exploring technologies and management practices associated with manufacturing products from renewable materials. Subjects covered include process automation, quality control, safety, and preventive maintenance programs. Graduate students are responsible for preparing case studies to demonstrate how manufacturing management programs are integrated into operations. *PREREQS: WSE 461 or WSE 561; may be waived with instructor approval.*

WSE 571 RENEWABLE MATERIALS IN BUILDING CONSTRUCTION (3 credits)
Building construction is a major application of renewable materials, primarily wood. This course explores material selection options, applications, and performance characteristics. Residential construction is emphasized, but non-residential construction applications will also be discussed. Concepts and interpretation of life cycle assessment are introduced. *PREREQS: Junior standing.*

WSE 573 BIOENERGY AND ENVIRONMENTAL IMPACT (3 credits)
Explores world's use of woody biomass fuels, their potential to contribute to our region's energy supply, and conversion technologies such as direct combustion, pyrolysis, and thermochemical modification. Also examines emissions and other environmental impacts of utilizing renewable materials to generate energy and manufacture products. *PREREQS: (MTH 111 or MTH 112 or MTH 231 or MTH 241 or MTH 245 or MTH 251 or MTH 251H) and (CH 122 or CH 222) or graduate standing.*

WSE 575 ENVIRONMENTAL ASSESSMENT OF BUILDING MATERIALS (4 credits)
Study of sustainability in the built environment from a building material perspective. Understanding the ecology of building materials and assessing their environmental sustainability performance using life cycle analysis. Critical discussion of case studies and future of LCA in the built environment. *PREREQS: Junior in good academic standing.*

WSE 592 ADVANCED WOOD DESIGN (4 credits)
Study of advanced concepts in wood properties and design. Design and analysis of specialty wood connectors. Design of wood members for adverse conditions including fire design. Common failure mechanisms and forensic engineering concepts. Design for durability. *Lec/lab. PREREQS: Graduate only. Undergraduates can take it for graduate credits. Understanding of basic concepts in mechanics and timber design is preferred.*

WSE 599 SPECIAL TOPICS (1-16 credits)

WSE 601 RESEARCH AND SCHOLARSHIP (1-16 credits)

WSE 603 THESIS (1-16 credits)

WSE 605 READING AND CONFERENCE (1-16 credits)

WSE 606 PROJECTS (1-16 credits)

WSE 607 SEMINAR Section 1: Beginning Seminar (1 credit)
Section 2: Graduate Seminar (2 credits)

WSE 611 SELECTED TOPICS IN WOOD AND FIBER SCIENCE (1-3 credits)

WSE 699 SPECIAL TOPICS (1-16 credits)

Typical Schedule of WS&E Graduate Courses

MS STUDENT TYPICAL SCHEDULE

Fall (1st Term)

WSE 507, Section 1 – Beginning Seminar (1 credit)
WSE 507, Section 2 – Graduate Seminar (1 credit)
WSE 520 – The Global Context of the Forest Sector (3 credits)
ST 511 – Methods of Data Analysis (4 credits)
3+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Winter (2nd Term)

WSE 507, Section 2 – Graduate Seminar (1 credit)
WSE 521 – Wood Science I w/ Lab (4 credits)
7+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Spring (3rd Term)

WSE 507, Section 2 – Graduate Seminar (1 credit)
WSE 522 – Wood Science II, w/ Lab (4 credits)
WSE 503 – Thesis (3 credits)
4+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Fall (4th Term)

WSE 503 – Thesis (3 credits)
WSE 507, Section 2 – Graduate Seminar (1 credit)
8+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Winter (5th Term)

WSE 503 – Thesis (5 credits)
WSE 507, Section 2 – Graduate Seminar (1 credit)
6+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Spring (6th Term)

WSE 503 – Thesis (4 credits)
WSE 507, Section 2 – Graduate Seminar (1 credit)
7+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

PHD STUDENT TYPICAL SCHEDULE

Fall (1st Term)
WSE 520 – The Global Context of the Forest Sector (3 credits)
WSE 603 – Thesis (3 credits)
WSE 607, Section 1 – Beginning Seminar (1 credit)
WSE 607, Section 2 – Graduate Seminar (1 credit)
4+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Winter (2nd Term)
WSE 521 – Wood Science I w/ Lab (4 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
7+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Spring (3rd Term)
WSE 522 – Wood Science II w/ Lab (4 credits)
WSE 607, Section 2 – Graduate Seminar – (1 credit)
7+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Fall (4th Term)
WSE 603 – Thesis (3 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
8+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Winter (5th Term)
WSE 603 – Thesis (3 credits)
WSE 605 – Reading & Conference (3 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
5+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Spring (6th Term)
WSE 603- Thesis (11 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
Up to 4 other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Fall (7th Term)
WSE 603- Thesis (11 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
Up to 4 other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Winter (8th Term)
WSE 603- Thesis (11 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
Up to 4 other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Spring (9th Term)
WSE 603- Thesis (11 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
Up to 4 other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Summer (10th Term)
WSE 603- Thesis (9 credits)
Total credits: 9-16

Fall (11th Term)
WSE 603- Thesis (7 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
4+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

Winter (12th Term)
WSE 603- Thesis (6 credits)
WSE 607, Section 2 – Graduate Seminar (1 credit)
5+ other credits, either within WSE, your 2nd major field, or in your minor
Total credits: 12-16

REQUIREMENTS FOR MASTER OF SCIENCE (M.S.) DEGREE IN WOOD SCIENCE

I. GENERAL REQUIREMENTS

General University requirements are included in the Graduate School's website at: http://gradschool.oregonstate.edu/success.

II. REQUIREMENTS OF THE DEPARTMENT

A. Graduate Course Requirements

Major

WSE 503 Thesis (6-12 credits)
WSE 507-1 Beginning Seminar (1 credit) – Required to be taken during 1st year
WSE 507-2 Graduate Seminar (1 credit)
WSE 520 The Global Context of the Forest Sector (3 credits)
WSE 521 Wood Science I (4 credits)
WSE 522 Wood Science II (4 credits)
Additional approved courses** (6–8 credits)

**Includes all 500- and 600- level courses in Wood Science & Engineering

Minor (either integrated or separate field)

5xx/6xx level courses approved by the minor department (15 credits minimum)

Total credits in M.S. program (minimum): 45

B. Seminar Participation

All full-time wood science Master of Science (MS) graduate students are expected to register for and attend WSE 507, Section 2 each term that it is offered unless excused by the Department Head. All Wood Science MS graduate students must give at least one Graduate Seminar presentation as a requirement for their degree.

C. Thesis Requirements

The student must submit a satisfactory thesis on their research. The thesis must be approved by the student's graduate advisory committee and must meet Graduate School requirements. The student shall provide one hard bound copy of the approved thesis to be a permanent reference in the Department. Please check with major professor to see if they need a copy as well.

D. Qualifying Examination

Master's students must pass a qualifying exam that evaluates understanding of basic wood sciences per the SWST Basic Wood Sciences competencies (http://www.swst.org/edu/pdfs/accred_handbook.pdf?ts=1023345702), and tests the ability to identify common wood products. The test will be offered one time each quarter. Students must pass the test prior to scheduling their final exam and may take the exam a maximum of three times. The Qualifying Exam Committee will grade the exam and judge whether the student has passed or failed the exam.

E. Final Examination

A final oral examination is required of all students. The exam includes a presentation of the thesis and then a comprehensive examination covering the thesis and course work. The examining committee is the student's graduate advisory committee.

The thesis presentation for this examination is open to all University faculty, graduate students, undergraduate students, and the public. The time and place of the final examination must be announced in advance to the WS&E department. At the end of the presentation the non-committee attendees are dismissed and the session becomes closed for the student and committee.

At the conclusion of the examination the committee decides if the student has passed or failed.

III. PROCEDURAL REQUIREMENTS

A. Graduate Student Advisory Committee

The committee is composed of at least four (4) members: the major professor, the minor professor, a departmental representative, and a Graduate Council Representative.

The departmental representative is selected from the Wood Science & Engineering faculty by the major professor and the student. This representative is a permanent member of the student's faculty advisory committee and has responsibility for ensuring that departmental requirements are met. The departmental representative is involved in planning the course program, the topic of the thesis, and assuring that during the examination, a fair balance of questions is maintained on all coursework in the student's program.

A faculty member representing the minor department is also included as a permanent member of the advisory committee.

The Graduate Council Representative (GCR) is an impartial committee member who advocates for the student and insures that all rules governing committee procedures are followed. They must be present at your final defense. A GCR is selected by the student from an approved list generated from the Graduate School's website at: http://gradschool.oregonstate.edu/forms#gcr.

B. Program of Study

A Program of Study is created by the student and their committee to outline courses that will be taken to meet departmental and university requirements.

The Program of Study can include graduate credits earned as an undergraduate (if in excess of the requirements for a baccalaureate degree), a post baccalaureate student, non-degree seeking student, or graduate student. Coursework taken at other institutions can also be listed, provided it meets the Graduate School's transfer credit policy: http://catalog.oregonstate.edu/ChapterDetail.aspx?key=38#Section1802. Master's students can transfer in up to 15 credits of graduate level coursework.

The deadline for turning in a program of study is as follows:

- MS Students: Prior to completing 18 hours of graduate credit; approximately 2 terms in.

C. Research Plan

All Wood Science graduate students shall prepare a written research study plan or proposal with the guidance and direction of their major professor and committee. The plan shall be presented to the committee for approval by the end of four terms in residence. The approved plan shall be filed in the departmental office.

D. Performance Expectations

Students shall be evaluated annually by their major professor and/or committee on their progress toward completing the degree program. A written copy will be filed in the departmental office. For students employed as GRAs this evaluation will normally be done prior to reappointment. The major professor and/or committee may require more frequent evaluations and additional means of assessing performance and ability. Students are expected to maintain a 3.0 grade point average, both overall and on program of study classes to be satisfactorily progressing toward degree completion.

REQUIREMENTS FOR DUAL MS IN WOOD SCIENCE AND A SECOND MAJOR

I. GENERAL REQUIREMENTS

General University requirements are included in the Graduate School's website at: http://gradschool.oregonstate.edu/success.

II. REQUIREMENTS OF THE DEPARTMENT

A. Graduate Course Requirements

Wood Science and Engineering Major Requirements

WSE 503 Thesis (6 credits)
WSE 507-1 Beginning Seminar (1 credit)
WSE 507-2 Graduate Seminar (1 credit)
WSE 520 The Global Context of the Forest Sector (3 credits)
WSE 521 Wood Science I (4 credits)
WSE 522 Wood Science II (4 credits)
Additional approved courses* (11+ credits)

*Includes all 500- and 600- level courses in Wood Science & Engineering

WSE Major Total: 30+ credits

Second Major Requirements

Courses in or related to the second major**

***Please check with second major department as credit requirements may vary; thesis credits can be WSE 503 if program accepts them*

Second Major Total: 30+ credits

Total credits in dual M.S. program (minimum): 60

B. Seminar Participation

All full-time Wood Science Master of Science (MS) graduate students are expected to register for and attend WSE 507, Section 2 each term that it is offered unless excused by the Department Head. All Wood Science MS graduate students must give at least one Graduate Seminar presentation as a requirement for their degree.

C. Thesis Requirements

The student must submit a satisfactory thesis on their research. The thesis must be approved by the student's graduate advisory committee and must meet Graduate School requirements.

The student shall provide one hard bound copy of the approved thesis to be a permanent reference in the WSE Department. A second, bound copy of the thesis may be required by the second major department. Please check with both major professors to see if they need a copy as well.

D. Qualifying Examination:

Master's students must pass a qualifying exam that evaluates understanding of basic wood sciences per the SWST Basic Wood Sciences competencies (http://www.swst.org/accred_handbook.pdf) and test the ability to identify common wood

products. The test will be offered one time each quarter. Students must pass the test prior to scheduling their final exam and may take the exam a maximum of three times. The Qualifying Exam Committee will grade the exam and judge whether the student has passed or failed the exam.

E. Final Examination

A final oral examination is required of all students. The exam includes a presentation of the thesis and then a comprehensive examination covering the thesis and course work. The examining committee is the student's graduate advisory committee.

The thesis presentation for this examination is open to all University faculty, graduate students, undergraduate students, and the public. The time and place of the final examination must be announced in advance to the WS&E department. At the end of the presentation the non-committee attendees are dismissed and the session becomes closed for the student and committee.

At the conclusion of the examination the committee decides if the student has passed or failed.

III. PROCEDURAL REQUIREMENTS

A. Committees for Dual MS Degrees

Each dual major MS student shall have one committee which is typically composed of a major professor from WS&E, a major professor from the second major department, one representative from each department, and the Graduate Council Representative (GCR).

The departmental representatives are selected by the student and the major professors and are permanent members of the student's advisory committee. The departmental representatives are involved in planning the course program and topic of the thesis, ensuring that departmental requirements are met, and that a fair balance of questions on all course work in the student's program are raised at the examination.

The Graduate Council Representative (GCR) is an impartial committee member who advocates for the student and insures that all rules governing committee procedures are followed. They must be present at your final defense. A GCR is selected by the student from an approved list generated from the Graduate School's website at: http://gradschool.oregonstate.edu/forms#gcr.

B. Program of Study for the Dual MS Degree

A Program of Study is created by the student and their committee to outline courses that will be taken to meet the requirements of both departmental and the university.

The Program of Study can include graduate credits earned as an undergraduate (if in excess of the requirements for a baccalaureate degree), a post baccalaureate student, non-degree seeking student, or graduate student. Coursework taken at other institutions can also be listed, provided it meets the Graduate School's transfer credit policy: http://catalog.oregonstate.edu/ChapterDetail.aspx?key=38#Section1802. Master's students can transfer in up to 15 credits of graduate level coursework.

Students on a GRA funded by a WS&E account must identify WS&E as the primary department on their program of study.

C. Research Plan

All Wood Science graduate students, including dual majors, will prepare a written research study plan or proposal with the guidance and direction of their major professors and committee. The plan will be presented to the committee no later than the end of four terms in residence. The approved plan will be filed in the departmental office.

D. Performance Expectations

All students will be evaluated annually by their major professor and/or committee on their progress toward completing the degree program. An evaluation will be filed with the departmental office. For students employed as GRAs, this evaluation will normally be done prior to reappointment. The major professors and/or the committee may require more frequent evaluations and additional means of assessing performance and ability. Students are expected to maintain a 3.0 grade point average, both overall and on program of study classes to be satisfactorily progressing toward degree completion.

REQUIREMENTS FOR DOCTOR OF PHILOSOPHY DEGREE IN WOOD SCIENCE

I. GENERAL REQUIREMENTS

General University requirements are included in the Graduate School's website at: http://gradschool.oregonstate.edu/success. Students seeking a dual Doctor of Philosophy degree should see the section "Requirements for Dual Doctor of Philosophy Degree in Wood Science".

II. REQUIREMENTS OF THE DEPARTMENT

The program may include all courses beyond the Bachelor's degree level. A single, double, or integrated minor must be specified.

A. Graduate Course Requirements

Major

WSE 520 The Global Context of the Forest Sector (3 credits)
WSE 521 Wood Science I (4 credits)
WSE 522 Wood Science II (4 credits)
WSE 607-1 Beginning Seminar (1 credit)
WSE 607-2 Graduate Seminar (2 credits)
WSE 603 Thesis (36+ credits)
Additional approved courses* (40+ credits)
*Includes all 500- and 600- level courses in Wood Science & Engineering

Minor (either integrated or separate field)

5xx/6xx level courses approved by the minor department (18 credits minimum)

Total credits in Ph.D. program (minimum): 108

B. Program Requirements

- A level of work consistent with the degree.
- A maximum of 15 blanket credits, excluding thesis credits.
- Three years of full-time work beyond the Bachelor's degree.
- Minimum of 36 credits of graduate work in residence.
- Transfer courses must have a grade of B or better.
- All other, non-conflicting rules and requirements governing the Ph.D. apply.

C. Seminar Participation

All full-time wood science PhD graduate students are expected to register for and attend WSE 607, Section 2 each term that it is offered unless excused by the Department Head. All Wood Science PhD students must give at least two Graduate Seminar presentations as a requirement for their degree.

D. Qualifying Examination

PhD students must pass a qualifying exam to be eligible for the preliminary exam. The Qualifying Exam evaluates student understanding of basic wood sciences per the SWST Basic Wood Sciences competencies (http://www.swst.org/accred_handbook.pdf), and tests the ability to identify common wood products. The test will be offered one time each quarter. Students must pass the test prior to scheduling their preliminary exam and may take the exam a

maximum of three times. The Qualifying Exam Committee will grade the exam and judge whether the student has passed or failed the exam.

E. Dissertation Requirements

The student must submit a satisfactory dissertation based on their research. The dissertation must be approved by the student's graduate advisory committee and must meet Graduate School requirements. The student will provide one hard bound copy of the approved dissertation to be a permanent reference in the Department.

F. Preliminary and Final Examinations

All Wood Science doctoral students are required to pass both a preliminary and a final examination. The objectives of these examinations are to evaluate a candidate's understanding of fundamental subject matter in wood science and technology, and associated basic principles in their specialized area. The exams test the student's ability to recall, interpret, and use facts and ideas to communicate answers and to think critically, logically, and originally.

Preliminary Exam: The preliminary exam evaluates the student's knowledge and understanding of subject matter areas. This exam has both written and oral portions. The written exam must be passed before the oral exam is administered. The major professor, in consultation with the student's graduate committee, may choose either a traditional written exam or development of a research proposal.

The traditional written exam will consist of a series of questions developed by the doctoral committee. The student is given a specific time limit to complete the exam and return the responses to the major professor. The major professor will distribute all questions and student responses to the entire committee. Each committee member evaluates the specific questions they posed and then responds to the major professor with either pass or fail. Students pass the written exam with no more than one vote of fail.

The development of a research proposal option may be chosen if there is evidence that the student has mastered the basics of wood science and his or her core area, has shown maturity in intellectual development, is planning a career that will involve numerous proposals, and has little experience with proposal writing. The major professor, in consultation with the doctoral committee, will select a topic for which the student will develop a research proposal. Any topic in wood science may be selected as long as it is not closely related to the research area that the student has selected for his/her dissertation or for a previous degree. At the discretion of the major professor the student may be offered a list of potential topics developed by the doctoral committee from which one may be selected by the student, or the student may be asked to submit a list of potential topics from which the committee will pick one.

The proposal assignment will be given in writing and will include the topic, instructions about limitations on the use of outside resources (e.g., internet, discussions with other people, editing/writing help, etc.), document preparation guidelines such as length limitations and format, scope of what the proposal should include (e.g., background, objectives, project description, timeline, references, budget, budget justification, layperson summary, and other criteria), and any specific guidance on budget

assumptions, equipment availability, etc. The student will be given a time limit for writing the proposal that usually will range from 2 to 4 weeks. The proposal will be delivered to the entire doctoral committee. Each committee member independently evaluates the proposal and responds to the major professor with either a pass or fail. Students pass the written exam with no more than one failing vote.

The oral examination will be given by the student's doctoral committee, typically within 3 weeks after the student has passed the written portion. It should be scheduled for a 3 hour period. The oral exam will not include a presentation by the student, nor will it be combined with other committee business to ensure that the committee and student are focused on the exam itself. Students should review core disciplinary materials in advance and may talk to committee members about potential areas of questioning. The committee judges whether the student has passed the exam and is advanced to candidate status following the requirements in the OSU Graduate Catalog.

Final Examination: A final presentation on the dissertation work and an oral examination covering the dissertation and knowledge of major and minor fields is required. The candidate will make a public presentation of the dissertation. This is open to faculty, staff, students, guests, and the public and targets a lay audience; it should be about 45 minutes long. Following the open presentation, the candidate will be examined in a closed session by the doctoral committee that should be scheduled for an additional 2.5 hours. During this examination the candidate is expected to defend his or her dissertation and to demonstrate satisfactory knowledge of wood science and associated fields. The examining committee judges if the candidate passes or fails the final examination and follows the proscribed procedures of the OSU Graduate Catalog.

After satisfactory completion of the written exam, the oral preliminary examination is given by the student's doctoral committee. Graduate School regulations dictate procedures for ascertaining the successful or unsuccessful completion of the oral preliminary examination and subsequent advancement of the student to Ph.D. candidate status.

III. PROCEDURAL REQUIREMENTS

A. Student Advisory Committee

The student's advisory committee consists of at least five (5) members of the graduate faculty. These include the major professor, a departmental representative, one from the minor department (optionally two for a double minor of the principal fields of the integrated minor), and a Graduate Council Representative. The departmental representative is selected from the Wood Science & Engineering graduate faculty by the major professor and the student.

This representative is a permanent member of the student's advisory committee and has responsibility for ensuring that departmental requirements are met. The departmental representative is involved in planning the course program and the topic of the report, and assuring that during the examination a fair balance of questions is maintained on all coursework in the student's program. The committee is selected by the major professor and the student with the approval of the Department Head.

The Graduate Council Representative (GCR) is an impartial committee member who advocates for the student and insures that all rules governing committee procedures are followed. They must be present at your final defense. A GCR is selected by the student from an approved list generated from the Graduate School's website at: http://gradschool.oregonstate.edu/forms#gcr.

B. Program of Study

A program planning meeting must be held with the student and the student's advisory committee members. A Program of Study is created by the student and their committee to outline courses that will be taken to meet the requirements of the departmental and the university.

A Doctoral Program Meeting checklist is required (see the Graduate School's website at: http://gradschool.oregonstate.edu/forms#meeting).

The Program of Study can include graduate credits earned as an undergraduate (if in excess of the requirements for a baccalaureate degree), a post baccalaureate student, non-degree seeking student, or graduate student. Coursework taken at other institutions can also be listed, provided it meets the Graduate School's transfer credit policy: http://catalog.oregonstate.edu/ChapterDetail.aspx?key=38#Section1802. PhD students are not limited on the amount of credits they are able to transfer in, as long as the doctoral residence requirement is satisfied.

The deadline for turning in a program of study is as follows:

- PhD Students who hold a Master's degree: Submit within one (1) calendar year of enrolling in the program
- PhD students without a Master's degree: Submit by the end of your 5th quarter.

C. Research Plan

All Wood Science graduate students shall prepare a written research study plan or proposal with the guidance and direction of their major professor and committee. The plan shall be presented to the committee for approval by the end of four terms in residence. The approved plan shall be filed in the departmental office.

D. Performance Expectations

All students shall be evaluated annually by their major professor and/or committee on their progress toward completing the degree program. A written copy will be filed in the departmental office. For students employed as GRAs this evaluation will normally be done prior to reappointment. The major professor and/or committee may require more frequent evaluations and additional means of assessing performance and ability.

Students are expected to maintain a 3.0 grade point average, both overall and on program of study classes to progress toward degree completion.

REQUIREMENTS FOR DUAL PHD IN WOOD SCIENCE AND A SECOND MAJOR

I. GENERAL REQUIREMENTS

General University requirements are included in the Graduate School's website at: http://gradschool.oregonstate.edu/success.

II. REQUIREMENTS OF THE DEPARTMENT

A. Graduate Course Requirements

Wood Science & Engineering Major

WSE 520 The Global Context of the Forest Sector (3 credits)
WSE 521 Wood Science I (4 credits)
WSE 522 Wood Science II (4 credits)
WSE 607-1 Beginning Seminar (1 credit)
WSE 607-2 Graduate Seminar (2 credits)
WSE 603 Thesis (36 credits minimum)
Additional approved courses* (22+ credits)

*Includes all 500- and 600- level courses in Wood Science & Engineering

WSE Major Total: 72+ credits

Second Major Requirements

Courses in or related to the second major**

***Please check with second major department as credit requirements may vary; thesis credits can be WSE 603 if program accepts them*

Second Major Total: 72+ credits

Total credits in dual Ph.D. program (minimum): 144 credits

B. Program Requirements

- A level of work consistent with the degree.
- A maximum of 15 blanket credits, excluding thesis credits.
- Three years of full-time work beyond the Bachelor's degree.
- Minimum of 36 credits of graduate work in residence.
- Transfer courses must have a grade of B or better.
- All other, non-conflicting rules and requirements governing the Ph.D. apply.

C. Seminar Participation

All full-time wood science PhD graduate students are expected to register for and attend WSE 607, Section 2 each term that it is offered unless excused by the Department Head. All Wood Science PhD students must give at least two Graduate Seminar presentations as a requirement for their degree.

D. Qualifying Examination

PhD students must pass a qualifying exam to be eligible for the preliminary exam. The Qualifying Exam evaluates understanding of basic wood sciences per the SWST Basic Wood

Sciences competencies (http://www.swst.org/accred_handbook.pdf), and tests ability to identify common wood products.
The test will be offered one time each quarter. Students must pass the test prior to scheduling their preliminary exam and may take the exam a maximum of three times. The Qualifying Exam Committee will grade the exam and judge whether the student has passed or failed the exam.

E. Dissertation Requirements
The dissertation must show evidence of originality and a real contribution to knowledge in both of the major fields. The dissertation must be approved by the student's graduate advisory committee, be satisfactory to both major departments, and meet the Graduate School requirements.

The student shall provide one hard bound copy of the approved dissertation to be a permanent reference in the WSE Department. A second, bound copy of the dissertation may be required by the second major department. Please check with both major professors to see if they need a copy as well.

F. Preliminary and Final Examinations
Doctoral students are required to pass both a preliminary and a final examination. The objective of these examinations are to evaluate a candidate's understanding of fundamental subject matter in wood science and technology and the associated basic principles in his/her specialized area.

Candidates must be able to demonstrate an ability to analyze subject matter questions and problems and synthesize answers and solutions. The examination tests a student's ability to interpret and use facts and ideas rather than merely recall them. It also reveals the student's ability to think critically and originally about a research problem in their area of specialization.

> **Preliminary Exam:** The preliminary exam evaluates the student's knowledge and understanding of subject matter areas. This exam has both written and oral portions. The written exam must be passed before the oral exam is administered. The major professor, in consultation with the student's graduate committee, may choose either a traditional written exam or development of a research proposal. The traditional written exam will consist of a series of questions developed by the doctoral committee. The student is given a specific time limit to complete the exam and return the responses to the major professor. The major professor will distribute all questions and student response to the entire committee. Each committee member evaluates the specific questions they posed and then responds to the major professor with either pass or fail. Students pass the written exam with no more than one vote of fail.
>
> The development of a research proposal option may be chosen if there is evidence that the student has mastered the basics of wood science and his or her core area, has shown maturity in intellectual development, is planning a career that will involve numerous proposals, and has little experience with proposal writing. The major professor, in consultation with the doctoral committee, will select a topic for which the student will develop a research proposal. Any topic in wood science may be selected as long as it is not closely related to the research area that the student has selected for his/her dissertation or for a previous degree. At the discretion of the major professor,

the student may be offered a list of potential topics developed by the doctoral committee from which one may be selected by the student, or the student may be asked to submit a list of potential topics from which the committee will pick one.

The proposal assignment will be given in writing and will include the topic, instructions about limitations on the use of outside resources (e.g., internet, discussions with other people, editing/writing help, etc.), document preparation guidelines such as length limitations and format, scope of what the proposal should include (e.g., background, objectives, project description, timeline, references, budget, budget justification, layperson summary, etc.), and any specific guidance on budget assumptions, equipment availability, etc. The student will be given a time limit for writing the proposal that usually will range from 2 to 4 weeks. The proposal will be delivered to the entire doctoral committee. Each committee member independently evaluates the proposal and responds to the major professor with either pass or fail. Students pass the written exam with no more than one vote of fail.

The oral examination will be given by the student's doctoral committee, typically within 3 weeks after the student has passed the written portion. It should be scheduled for a 3 hour period. The oral exam will not include a presentation by the student, nor will it be combined with other committee business to ensure that the committee and student are focused on the exam itself. Students should review core disciplinary materials in advance and may talk to committee members about potential areas of questioning. The committee judges whether the student has passed the exam and is advanced to candidate status following the requirements in the OSU Graduate Catalog.

Final Examination: A final presentation on the dissertation work and an oral examination covering the dissertation and knowledge of major and minor fields is required. The candidate will make a public presentation of the dissertation. This is open to faculty, staff, students, guests, and the public and targets a lay audience; it should be about 45 minutes long. Following the open presentation, the candidate will be examined in a closed session by the doctoral committee that should be scheduled for an additional 2.5 hours. During this examination the candidate is expected to defend his or her dissertation and to demonstrate satisfactory knowledge of wood science and associated fields. The examining committee judges if the candidate passes or fails the final examination and follows the proscribed procedures of the OSU Graduate Catalog.

III. PROCEDURAL REQUIREMENTS

A. Program of study for the Dual PhD Degree

A program planning meeting must be held with the student and the student's advisory committee members. A Program of Study is created by the student and their committee to outline courses that will be taken to meet the requirements of both departments and the university.

A Doctoral Program Meeting checklist is required (see the Graduate School's website at: http://gradschool.oregonstate.edu/forms#meeting).

The Program of Study can include graduate credits earned as an undergraduate (if in excess of the requirements for a baccalaureate degree), a post baccalaureate student,

non-degree seeking student, or graduate student. Coursework taken at other institutions can also be listed, provided it meets the Graduate School's transfer credit policy: http://catalog.oregonstate.edu/ChapterDetail.aspx?key=38#Section1802. PhD students are not limited on the amount of credits they are able to transfer in, as long as the doctoral residence requirement is satisfied.

The deadline for turning in a program of study is as follows:

- PhD Students who hold a Master's degree: Submit within one (1) calendar year of enrolling in the program
- PhD students without a Master's degree: Submit by the end of your 5th quarter.

Students on a GRA funded by a WS&E account must identify WS&E as the primary department on their program of study.

B. Committees for Dual PhD Degrees

Each dual major PhD student shall have one committee which is typically composed of a major professor from WS&E, a major professor from the second major department, one representative from each department, and the Graduate Council Representative (GCR) for a total of five (5) committee members.

The student has the option of one or two major professors. If one major professor is selected then the professor must be approved to direct doctoral theses in both of the major fields. If two major professors from the two major fields are selected then each must be approved to direct doctoral theses in their field.

If there is only one major professor then two committee members must be selected from the other major department. The departmental representatives are selected by the student and the major professors and are permanent members of the student's advisory committee. The departmental representatives are involved in planning the course program, topic of the thesis ensuring that departmental requirements are met, and that a fair balance of questions on all course work in the student's program are raised at the examination.

The Graduate Council Representative (GCR) is an impartial committee member who advocates for the student and insures that all rules governing committee procedures are followed. They must be present at your final defense. A GCR is selected by the student from an approved list generated from the Graduate School's website at: http://gradschool.oregonstate.edu/forms#gcr.

C. Research Plan

All Wood Science graduate students, including dual majors, will prepare a written research study plan or proposal with the guidance and direction of their major professor(s) and committee. The plan will be presented to the committee no later than the end of four terms in residence. The approved plan will be filed in the departmental office.

D. Performance Expectations

All students will be evaluated annually by their major professor and/or committee on their progress toward completing a degree program. A written copy will be filed in the departmental office. For students employed as GRAs this evaluation will normally be done prior to reappointment. The major professor(s) and/or the committee may require more frequent evaluations and additional means of assessing performance and ability.

Students are expected to maintain a 3.0 grade point average, both overall and on program of study classes to be satisfactorily progressing toward degree completion.