

# Forest Engineering Program

## Forest Engineering / Civil Engineering Dual Degree Program

### Undergraduate Advising Guide

2008 – 2009 Academic Year

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Congratulations on selecting one of our Forest Engineering degree programs at Oregon State University. Graduates from either degree program receive a rigorous blend of engineering and forestry education that provides a foundation for amazingly diverse career options. There are only two other universities in the U.S. that offer forest engineering degrees, and this is the only one that is accredited in both engineering and forestry. The FE/CE dual degree is unique; it is not available at any other university in North America.

Graduates from both degree programs are prepared to play a variety of key roles in helping meet the world's appetite for wood products from sustainable forests, while also protecting other resource values such as soils, water, wildlife habitat, and recreation opportunities. In a world of more than 6 billion people, society's wood demands are enormous and growing, even with aggressive recycling programs. Many graduates help meet these demands through positions that plan, design, and implement forestry activities -- applying the best engineering, science, technology and experience available to conduct safe, cost effective, and environmentally responsible forest operations.

Other graduates, especially those from the FE/CE degree program, sometimes pursue careers with less forestry focus. Examples include land development, surveying engineering, transportation engineering and management, environmental consulting, and even municipal engineering. The 5-yr dual degree is a challenge to complete, but commonly provides the most diverse job options and highest starting salaries.

Traditional forest engineering jobs typically involve developing and maintaining transportation systems and planning and designing timber harvests. Forest products or timberland management companies, federal or state agencies, and consulting or contracting firms are the most common entry level employers for graduates. Some stay in field oriented positions for much of their career, but many graduates have also become successful managers and executives as they gain experience. A substantial number of graduates find opportunity and satisfaction in owning their own consulting or contracting business, especially if they have some entrepreneurship in their blood.

All of these types of positions represent vibrant and timely career opportunities. Forestry continues to be a cornerstone of the economy of many communities, providing jobs and economic vitality. This is a good time to be entering this field as the baby boomer generation begins to retire. As the population of the world grows and natural resource challenges become more complex the need for well-rounded highly trained forest engineers becomes greater. We at Oregon State University are working to fill that need! You have made a good choice.

You will be in for an exciting career!

## Introduction

Forest Engineering at Oregon State has a long tradition of excellence in undergraduate education. Our programs are designed to provide a solid Engineering background as well as fundamental knowledge in Forestry principles and practices. Simply stated, we provide an engineering education that focuses on solving the engineering problems of Forest Resource Management. It is appropriate that the Forest Engineering program is housed in the College of Forestry – the “Forest” in Forest Engineering is vital to the strength of our undergraduate programs. Employers in forest industries, consulting firms, and public agencies recognize this strength. The quality in the Forest Engineering program is maintained by including breadth and depth in both Forestry and Engineering topics in the curriculum. The Bachelor of Science in Forest Engineering curriculum is accredited by the Society of American Foresters (SAF) and by the Engineering Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700. The Civil Engineering program that is part of the Forest Engineering / Civil Engineering dual degree program is also accredited by the Engineering Commission of ABET.

This advising guide is your map through the Forest Engineering Curriculum, and the Forest Engineering / Civil Engineering dual degree curriculum that the Department shares with the School of Civil and Construction Engineering in the College of Engineering. **You should retain this advising guide and any updates that are published as you progress through the program, and utilize the various forms included to track your progress.** It is your obligation as an aspiring professional to maintain accurate records of your courses and accomplishments, just as the University registrar maintains the official University records of your progress.

This guide is a supplement to the Graduation Requirements and the Academic Regulations and Procedures of Oregon State University available on the web at <http://catalog.oregonstate.edu/> under the “Undergraduate Student Information” link.

## Forest Engineering Program Objectives

The Forest Engineering Program at Oregon State University prepares graduates to plan and implement solutions to complex forestry and natural resource problems. It provides work ready graduates to enter the diverse professional field of Forest Engineering. Early career assignments include harvest unit design, forest road location and design, contract inspection and administration, cost analysis, and forest transportation management. Mid-career assignments may involve aspects of engineering management including planning and budgeting, supervision, wood supply procurement and purchasing, harvest and road design reviews, and scheduling and controlling forest operations.

Preparation for a successful career in Forest Engineering is achieved through a program of study that is an outgrowth of the Departmental Mission of developing, communicating, and teaching the science, knowledge, and engineering necessary for sustainable management of forest, land and water resources that will achieve economic, environmental, and social objectives.

The Program Educational Objectives are achieved through an educational program that includes the following elements:

- Engineering in a Forestry Context

The Forest Engineering program will provide a rigorous engineering education within a forestry context.

- Forestry Principles

The Forest Engineering program will incorporate an adequate presentation of fundamental forestry principles so that Forest Engineering graduates will be able to develop engineered forest operations that achieve silvicultural objectives.

- Soil and Water Resources

The Forest Engineering program will incorporate an adequate presentation of the physical and biological aspects of soil and water resources so that Forest Engineering graduates will be able to develop engineered forest operations that appropriately protect these resources.

- Surveying and Measurement

The Forest Engineering program will incorporate adequate surveying and measurement of land and forest resources so that the engineering tasks associated with Forest Land Management, specifically, the design of appropriate Forest Operations can be effectively completed.

- Forest Transportation

The Forest Engineering program will incorporate adequate analysis and design principles for the physical and system aspects of the Forest Transportation infrastructure so that Forest Engineering graduates can provide designs and manage the forest transportation in a way that meets the needs of forest land management and minimizes environmental impact.

- Harvesting Operations

The Forest Engineering program will incorporate adequate analysis and design principles for the physical and system aspects of harvesting operations so that Forest Engineering graduates can plan and manage safe, economic, and environmentally sound forest operations.

- Planning and Economics

The Forest Engineering program will incorporate adequate principles and techniques for forest land management and operational planning in an environmental and economic context so that Forest Engineering graduates can effectively develop successful forest operation plans.

## Forest Engineering Program Outcomes

Along the way to your degree in Forest Engineering, you will be prepared to meet the challenges of professional practice in Forest Engineering by achievement of a series of “program outcomes” that describe the attributes that a graduate must possess in order to be successful as a professional. These program outcomes have been developed in part by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, and in part by the Forest Engineering faculty in consultation with the Forest Engineering Advisory Committee, made up of working professionals from the forest industry, forest engineering consulting firms, and state and federal agencies charged with the management of forest land and resources.

As a graduate of the Forest Engineering Program, you will have:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- (l) an ability to develop engineered forest operations that achieve silvicultural objectives.
- (m) an ability to develop engineered forest operations that appropriately protect soil and water resources
- (n) an ability to survey and measure land and forest resources so that the engineering tasks associated with Forest Land Management, specifically, the design of appropriate Forest Operations can be effectively completed
- (o) an ability to provide designs and manage the forest transportation in a way that meets the needs of forest land management and minimizes environmental impact.
- (p) an ability to plan and manage safe, economic and environmentally sound forest operations.
- (q) an ability to incorporate long term forest land management and operational planning in an environmental and economic context into forest operation plans.

## Advising and Assistance

The College of Forestry and the Department of Forest Engineering, Resources and Management are committed to helping students succeed. A part of that help deals with identifying majors and minors, and understanding broader University rules and regulations. The Department office staff and your faculty advisor are the starting points when you have questions, but another valuable resource for University procedures, rules and regulations is the College of Forestry Student Services office.

This advising guide provides details of the Forest Engineering program and Forest Engineering / Civil Engineering dual degree program not listed in the University Catalog, and helpful suggestions for your success as a student. The guide does not replace the need for regular term-by-term visits with your advisor. The FE and FE/CE programs are tightly structured programs which leave few elective choices to the student choosing to graduate within the required credit hour requirement. However, the choices that are required are very important to satisfying the intent of the curriculum and to providing the professional education that you desire. A close association with your advisor will help you make the best choices as you progress through the program. Your advisor is also an invaluable resource for discussions about options to add extra value to your education through additional coursework, minors, or additional degrees.

The advising effort is one of mutual respect and collaboration between you and your advisor. If the process is to be effective, both you and your advisor must meet certain obligations. With that in mind, below are key responsibilities shared between your advisor and you.

As an advisee, you should:

- **Understand and accept that you are ultimately responsible for your education and your own decisions.**
- Be prepared when you come to advising sessions; be active in your advising session, and ask questions when you have them.
- Understand and communicate personal values, abilities, and goals.
- Provide accurate and truthful information when being advised.
- Initiate a purposeful relationship with your advisor and make appointments when necessary or when in need of assistance.
- Keep your local address and phone number up to date in Student Online Services and utilize and **regularly check your ONID account.**
- Call to cancel appointments that cannot be kept.
- Learn and understand OSU's policies, procedures, and requirements as they relate to your academic success and/or degree completion.
- Follow through on plans-of-action identified during advising sessions.

Advisors should:

- **Develop a purposeful relationship with and be an advocate for their advisees.**
- Inform students of the nature of the advisor/advisee relationship.
- Assist students in defining and developing expressed educational, career, and life plans.
- Provide timely and accurate educational information.

- Promote learning opportunities that will help students define or meet personal goals and plans.
- Assist students in preparing a program that is consistent with their abilities and interests.
- Monitor progress toward educational/career goals.
- Interpret and provide rationale for institutional policies, procedures and requirements.
- Inform inquiring students of campus resources and special services available to them.
- Refer students to those resources that can enhance or supplement their academic or personal experience.

While your advisor has an important role and takes that role seriously, the important decisions are truly yours. It's up to you to take primary responsibility for planning your individual program and for meeting academic requirements and deadlines. Advisors can provide information, but you are the one to act on that information.

**Making an appointment is strongly encouraged. Make yourself aware of your advisor's posted office hours, or phone or email to arrange an appointment.**

### Forest Engineering Curriculum Overview

The coursework that makes up the Forest Engineering program is structured to begin with a broad general foundation in the Liberal Arts, Science, and Mathematics (Figure 1), followed by Forest Science and Engineering Science that provides a bridge between the basic sciences and Forest Management and Forest Engineering Science. The curriculum is topped off with Forest Engineering Synthesis, Analysis and Design, the hallmark of Forest Engineering Practice.

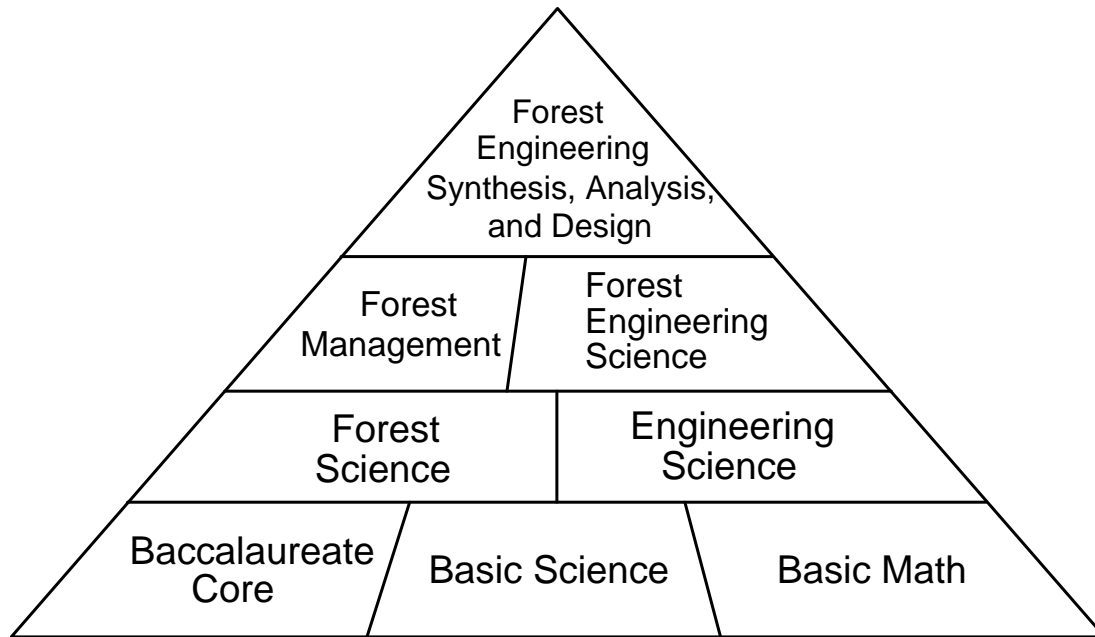


Figure 1. The Forest Engineering Curriculum Triangle

In addition to the structure and categories illustrated in the Figure above, the Forest Engineering program has been structured to satisfy the accreditation criteria of the Society of American Foresters (SAF) and of the Engineering Commission (EC) of ABET, Inc. SAF divides Forestry curricula into seven categories; Communication, Science and Math, Humanities and Social Science, Forest Ecology and Biology, Forest Measurements, Forest Management, and Forest Policy and Administration. ABET divides Engineering curricula into three categories: Mathematics and Basic Science, Engineering topics and a General Education Component. Many courses include material that fits in more than one category.

## Detailed Program Description

### Forest Engineering Program

The Forest Engineering curriculum is shown in term-by-term sequence in Table 1, and in Audit form in Table 2. The term-by-term sequence will change from time to time as the schedule of classes needs to be changed to accommodate faculty and student schedule constraints. The Audit form in Table 2 is useful for tracking your progress toward graduation. This form is exactly like the one that will be used by your advisor for graduation audits. The term-by-term sequence shown in Table 1 incorporates both course prerequisites and the term in which the courses are taught. There are a few cases where courses may be taken in more than one term. An example of this is the arrangement of English Composition (WR 121), Lifetime Fitness for Health (HHS 231), and Speech (COMM 111 or 114) in the Freshman year – WR 121 is scheduled alphabetically by your last name, hence you will have to take these courses in an order that fits with your term for WR 121. Further, the University does not provide enough sections of COMM 111 and 114 for all students to take one of these courses in the freshman year, hence you will most likely have to take your COMM course in a later year and take an alternate course during your freshman year. The term by term schedule should be followed closely for all Math, Physics, Chemistry, Engineering Science (ENGR), Forestry (FOR), Wood Science and Engineering (WSE) and Forest Engineering (FE) courses because there are no guarantees that courses will be taught at times that do not conflict with other required courses except during the term identified on Table 1. For this reason, **it is important that you consult with your advisor any time you wish to depart from the schedule given in Table 1. Missing a single course in the term in which it is offered could delay completion of your degree by an entire year.** The following list of bullets addresses specific details that you must consider as you take courses.

- **Elective Baccalaureate Core Courses (may be taken S/U)**

The University Baccalaureate Core is designed to ensure that graduates of OSU receive a liberal education. Elective Baccalaureate courses are those courses that satisfy a Baccalaureate Core requirement, but are not listed in the degree program requirements by “prefix” and “number”. The Baccalaureate Core includes many requirements that are fulfilled by courses required for the Forest Engineering degree – these courses may not be taken on an S/U basis. For example, the Math, Physical Science, Biological Science, and Social Processes and Institutions requirements are fulfilled by Differential Calculus (MATH 251), General Physics with Calculus (PH 211), Soils: Sustainable Ecosystems (CSS 205), and Introduction to Microeconomics (ECON 201) respectively. From the Forest Engineering perspective, the Social Processes and Institutions required course (ECON 201) and the remaining Baccalaureate Core requirements are intended to broaden the educational experience and perspective of the Forest Engineering student. These Baccalaureate Core courses are divided into the perspective course groups, which include, Western Culture (3 cr), Cultural Diversity (3 cr), Literature and Arts (3 cr), and Difference Power and Discrimination (3 cr), and synthesis course groups, which include Contemporary Global Issues (3 cr), and Science Technology and Society (3 cr). The perspectives courses are elective in the sense that they may be selected from a University-approved list with the provision that no more than two courses from the combined perspectives and synthesis groups may be taken from the same academic department. The synthesis courses have been selected to satisfy a Society of American Foresters accreditation requirement for a broader understanding of forest and forest system values, hence only a selected

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course for each requirement is shown. Some options may exist to address schedule conflicts – consult your academic advisor for specifics. Since the synthesis courses are listed by prefix and number, they must be taken for a grade.

- **Fitness (course may be taken S/U; “S” or “D” or better required)**

The Baccalaureate Core requires completion of the 2-credit course Lifetime Fitness for Health (HHS 231) and a 1-credit course from HHS 241-248 Lifetime Fitness: (various activities).

- **Communications (all courses must be graded; “D” or better required)**

A minimum of 10 credits of communications skill-building coursework is required for the Forest Engineering degree. English Composition (WR 121), and Technical Writing (WR 327) are required for written communication, and either Public Speaking (COMM 111) or Argument and Critical Discourse (COMM 114) is required for oral communication.

In addition, a one-credit-hour component of the Senior Capstone Sequence (FE 450, 451) has been dedicated to written communication. The senior capstone is listed as a Writing Intensive Course (WIC), which is part of the University Baccalaureate Core. Numerous additional communication exercises, which are intended to build on the basic communication skills obtained from these communications courses, are embedded in Forest Engineering courses at the junior (300) and senior (400) levels.

- **Using the Satisfactory /Unsatisfactory Grading System**

S/U grading can be selected only for **ELECTIVE** Baccalaureate Core courses counted toward the Forest Engineering Degree. Any course not counted toward the Forest Engineering Degree can be taken S/U.

- **Mathematics (all courses must be graded; “D” or better required)**

Under the current requirements, a passing grade of “D” is acceptable. The reality is that grades less than a “C” do not indicate proficiency adequate to continue in the Math sequence or for success in the Engineering Science sequence (ENGR 211, 212, and 213). You should consult with your advisor about the need to retake Math courses for which a grade lower than “C” is earned.

- **Basic Science (all courses must be graded; “C-” or better required in all College of Forestry courses; “D” or better required in all other courses)**

The Basic Science requirement includes Physics, Chemistry, Soil Science, and an array of Forest Biology and Ecology courses. Under the current requirements, a passing grade of “D” is acceptable in Basic Science courses taught outside the College of Forestry. The reality is that grades less than a “C” do not indicate proficiency adequate to continue in a Science sequence (e.g. PH 211, 212). You should consult with your advisor about the need to retake Science courses for which a grade lower than “C” is earned.

All required courses that include basic science content are listed in Table 2.

- **Engineering Topics (all courses must be graded; “C-” or better required in all College of Forestry courses; “D” or better required in all other courses)**

Engineering Science provides the bridge between the basic sciences and engineering synthesis and design. The classical Engineering Science sequence, Statics, Dynamics, and Strength of Materials, is easily identifiable as engineering science course material. Many other components of engineering science are less easily delineated, and make up only portions of engineering or other courses. In some cases, courses taught by other departments have engineering science character appropriate to Forest Engineering. For example, the application of basic mathematics to the Engineering and Management analysis of the “time value of money” is an engineering science topic even though it is presented in Forest Resource Economics I (FOR 330). Similarly, the application of mathematics and statistics to measurement of forest resource quantities is an engineering science topic even though it is presented in Forest Mensuration (FOR 321).

The heart of engineering practice is Synthesis and Design; hence Synthesis and Design are the capstone of an engineering education. Within Forest Engineering course work, the most common occurrence of engineering science topics is in the beginning of a course or course sequence, the latter portion of which is engineering synthesis or design. An example of this relationship between engineering science and design is in the Forest Operations Analysis (FE 440) and Production Planning (FE 441) sequence. Mathematics and an understanding of the process function of harvesting systems are used in Operations Analysis to break down and quantify the productivity components of a harvesting method or system – this is engineering science. Following that, in Production Planning, the results of applying mathematics to quantify the operational characteristics of harvesting are used to plan future harvesting operations – this is engineering synthesis or system design. The Engineering Design experience in the Forest Engineering program culminates in the Forest Operations Design sequence (FE 450, 451), which also fulfills the writing intensive course (WIC) requirement for the Baccalaureate core. This sequence provides the challenge and opportunity for students to integrate components of the entire curriculum, including the disciplines of Engineering, Forest Ecology, Silviculture, Fisheries, and Wildlife, into the design of a timber harvesting plan that meets a set of financial objectives developed with consideration of the time value of money and forest growth.

The Engineering Topics content of all the required courses in the curriculum is given in Table 2.

- **Forest Engineering Program Electives for admission to the Fundamentals of Land Surveying Examination**

The Oregon State Board of Examiners for Engineering and Land Surveying [OSBEELS] has established, through Oregon Administrative Rule [OAR] 820-010-0226, the minimum educational qualifications for admission to the Fundamentals of Land Surveying Examination. These qualifications require that Forest Engineering graduates who wish to pursue a professional career in land surveying take additional coursework beyond that required for the Bachelor of Science in Forest Engineering. If you are interested in professional land surveying, please consult the listed OAR, and discuss the educational requirements with your advisor.

#### **DISCLAIMER:**

Future term data are continually updated. Check the web frequently for current information.

Table 1. Forest Engineering Curriculum Flow Chart

**Freshman Year (47)**

| Fall Term         |                                       |    | Winter Term       |  |    | Spring Term                |   |              |
|-------------------|---------------------------------------|----|-------------------|--|----|----------------------------|---|--------------|
| Course            |                                       | Cr | Course            |  | Cr | Course                     |   | Cr           |
| MTH 251           | Differential Calculus                 | 4  | MTH 252           | Integral Calculus                                    | 4  | MTH 254                    | Vector Calculus I                                     | 4            |
| CH 201            | Chemistry for<br>Engineering Majors   | 3  | WSE 210           | Wood Technology and<br>Utilization                   | 4  | PH 211                     | General Physics with<br>Calculus                      | 4            |
| FOR 111           | Introduction to Forestry              | 3  | HHS 231           | Lifetime Fitness for Health                          | 2  | FOR 141                    | Tree and Shrub<br>Identification                      | 3            |
| FE 101            | Introduction to Forest<br>Engineering | 2  | HHS<br>241-248    | Lifetime Fitness: (various<br>activities)            | 1  | CSS 205                    | Soils: Sustainable<br>Ecosystems [BC]                 | 4            |
| WR 121            | English Composition                   | 3  | FE 102            | Forest Engineering Problem<br>Solving and Technology | 3  | Comm 111<br>or<br>Comm 114 | Public Speaking<br>Argument and Critical<br>Discourse | 3<br>or<br>3 |
| <b>Term Total</b> |                                       |    | <b>Term Total</b> |  |    | <b>Term Total</b>          |   |              |
| <b>15</b>         |                                       |    | <b>14</b>         |  |    | <b>18</b>                  |   |              |

**Sophomore Year (46)**

| Fall Term         |  |    | Winter Term       |  |    | Spring Term       |  |    |
|-------------------|--|----|-------------------|--|----|-------------------|--|----|
| Course            |  | Cr | Course            |  | Cr | Course            |  | Cr |
| ST 314            | Introduction to Statistics<br>for Engineers                    | 3  | FE 309            | Forest Photogrammetry                  | 4  | ENGR 212          | Dynamics   | 3  |
| PH 212            | General Physics with<br>Calculus                               | 4  | MTH 256           | Applied Differential<br>Equations      | 4  | FE 330            | Forest Engineering Fluid<br>Mechanics & Hydraulics | 3  |
| ENGR 211          | Statics  | 3  | ENGR 213          | Strength of Materials                  | 3  | FOR 240           | Forest Biology [BC]                                | 4  |
| CE 201            | CE II: Engineering<br>Graphics & Design                        | 3  | ECON 201          | Introduction to<br>Microeconomics [BC] | 4  | FE 308            | Forest Surveying                                   | 4  |
| FE 314            | Forest Engineering<br>Recitation for<br>Engineering Statistics | 1  |                   |  |    | Elective          | Western Culture [BC]                               | 3  |
| <b>Term Total</b> |  |    | <b>Term Total</b> |  |    | <b>Term Total</b> |  |    |
| <b>14</b>         |  |    | <b>15</b>         |  |    | <b>17</b>         |  |    |

**Junior Year (48)**

| Fall Term         |  |    | Winter Term       |                                |    | Spring Term       |                               |    |
|-------------------|--|----|-------------------|--------------------------------|----|-------------------|-------------------------------|----|
| Course            |  | Cr | Course            |                                | Cr | Course            |                               | Cr |
| FOR 321           | Forest Mensuration                       | 5  | WR 327            | Technical Writing [BC]         | 3  | FE 316            | Soil Mechanics                | 4  |
| Elective          | Cultural Diversity [BC]                  | 3  | FE 315            | Soil Engineering               | 4  | FE 310            | Forest Route Surveying        | 4  |
| FE 371            | Harvesting Process<br>Engineering        | 4  | FE 470            | Logging Mechanics              | 4  | FE 471            | Harvesting Management         | 3  |
| FE 357            | GIS & Forest Engineering<br>Applications | 3  | FE 434            | Forest Watershed<br>Management | 4  | FE 440            | Forest Operations<br>Analysis | 3  |
|                   |  |    |                   |                                |    | FOR 441           | Silviculture Principles       | 4  |
| <b>Term Total</b> |  |    | <b>Term Total</b> |                                |    | <b>Term Total</b> |                               |    |
| <b>15</b>         |  |    | <b>15</b>         |                                |    | <b>18</b>         |                               |    |

**Senior Year (39)**

| Fall Term         |   |    | Winter Term       |   |    | Spring Term       |   |    |
|-------------------|---|----|-------------------|---|----|-------------------|---|----|
| Course            |   | Cr | Course            |   | Cr | Course            |   | Cr |
| FOR 330           | Forest Resource<br>Economics I                      | 4  | FE 451            | Forest Operations Design II<br>[WIC]                  | 3  | FE 449            | Strategic & Tactical<br>Planning Techniques               | 3  |
| FE 415            | Forest Road Engineering                             | 3  | FE 416            | Forest Road System<br>Management                      | 4  | *FW 350           | Endangered Species,<br>Society and Sustainability<br>[BC] | 3  |
| FE 450            | Forest Operations<br>Design I [WIC]                 | 3  | FE 460            | Forest Operations<br>Regulations and Policy<br>Issues | 3  | Elective          | Difference, Power, and<br>Discrimination [BC]             | 3  |
| FE 480            | Forest Engineering<br>Practice &<br>Professionalism | 1  | Elective          | Literature & Arts [BC]                                | 3  | **FE /<br>FOR 456 | International Forestry<br>[BC]                            | 3  |
| FE 441            | Production Planning                                 | 3  |                   |   |    |                   |   |    |
| <b>Term Total</b> |   |    | <b>Term Total</b> |   |    | <b>Term Total</b> |   |    |
| <b>14</b>         |   |    | <b>13</b>         |   |    | <b>12</b>         |   |    |

\*FW 350 baccalaureate core class in Science, Technology and Society, selected to satisfy SAF accreditation criteria

\*\*FE/FOR 456 baccalaureate core class in Contemporary Global Issues, selected to satisfy SAF accreditation criteria.

Table 2. Forest Engineering Program Audit Form

| Course Number         | Course Title   | Math / Science | Engr. Topics | Other | Term Taken | Grade | Substitution | + / - | Comments |
|-----------------------|--|----------------|--------------|-------|------------|-------|--------------|-------|----------|
|                       | Freshman Year  |                |              |       |            |       |              |       |          |
| MTH 251               | Differential Calculus [BC]                                 | 4              |              |       |            |       |              |       |          |
| CH 201                | Chemistry for Engineering Majors                           | 3              |              |       |            |       |              |       |          |
| WR 121                | English Composition [BC]                                   |                |              | 3     |            |       |              |       |          |
| FOR 111               | Introduction to Forestry                                   | 1              |              | 2     |            |       |              |       |          |
| FE 101                | Introduction to Forest Engineering                         |                | 1            | 1     |            |       |              |       |          |
|                       |  |                |              |       |            |       |              |       |          |
| MTH 252               | Integral Calculus  | 4              |              |       |            |       |              |       |          |
| WSE 210               | Wood Technology and Utilization                            |                | 4            |       |            |       |              |       |          |
| HHS 231               | Lifetime Fitness: Activity [BC]                            |                |              | 2     |            |       |              |       |          |
| HHS241-251            | Lifetime Fitness (various activities)                      |                |              | 1     |            |       |              |       |          |
| FE 102                | Forest Engineering Problem Solving & Technology            |                | 1            | 2     |            |       |              |       |          |
|                       |  |                |              |       |            |       |              |       |          |
| MTH 254               | Vector Calculus I  | 4              |              |       |            |       |              |       |          |
| PH 211                | General Physics with Calculus [BC]                         | 4              |              |       |            |       |              |       |          |
| FOR 141               | Tree and Shrub Identification                              | 3              |              |       |            |       |              |       |          |
| COMM111 or COMM114    | Public Speaking [BC]<br>Argument & Critical Discourse [BC] |                |              | 3     |            |       |              |       |          |
| CSS 205               | Soils: Sustainable Ecosystems [BC]                         | 4              |              |       |            |       |              |       |          |
| <b>+/- Subtotal</b>   |  |                |              |       |            |       |              |       |          |
| <b>Sophomore Year</b> |  |                |              |       |            |       |              |       |          |
| PH 212                | General Physics with Calculus                              | 4              |              |       |            |       |              |       |          |
| ENGR 211              | Statics  |                | 3            |       |            |       |              |       |          |
| CE 201                | CE II: Engineering Graphics & Design                       |                |              | 3     |            |       |              |       |          |
| ST 314                | Intro to Statistics for Engineers                          | 3              |              |       |            |       |              |       |          |
| FE 314                | Recitation for Statistics for Engineers                    | 1              |              |       |            |       |              |       |          |
|                       |  |                |              |       |            |       |              |       |          |
| MTH 256               | Applied Differential Equations                             | 4              |              |       |            |       |              |       |          |
| FE 309                | Forest Photogrammetry                                      |                | 4            |       |            |       |              |       |          |
| ENGR 213              | Strength of Materials                                      |                | 3            |       |            |       |              |       |          |
| ECON 201              | Introduction to Microeconomics [BC]                        |                |              | 4     |            |       |              |       |          |
|                       |  |                |              |       |            |       |              |       |          |
| ENGR 212              | Dynamics   |                | 3            |       |            |       |              |       |          |
| FE 330                | Forest Engineering Fluid Mechanics & Hydraulics            |                | 3            |       |            |       |              |       |          |
| FOR 240               | Forest Biology   | 4              |              |       |            |       |              |       |          |
| FE 308                | Forest Surveying   |                | 4            |       |            |       |              |       |          |
|                       | <b>Western Culture [BC]</b>                                |                |              | 3     |            |       |              |       |          |
| <b>+/- Subtotal</b>   |  |                |              |       |            |       |              |       |          |

| Course Number                      | Course Title   | Math / Science | Engr. Topics | Other     | Term Taken | Grade | Substitution | + / - | Comments                                |
|------------------------------------|--|----------------|--------------|-----------|------------|-------|--------------|-------|---|
|                                    | Junior Year  |                |              |           |            |       |              |       |   |
| FOR 321                            | Forest Mensuration   |                | 2            | 3         |            |       |              |       |   |
|                                    | <b>Cultural Diversity [BC]</b>                             |                |              | 3         |            |       |              |       |   |
| FE 371                             | Harvesting Process Engineering                             |                | 4            |           |            |       |              |       |   |
| FE 357                             | GIS and Forest Engineering Appl.                           |                | 2            | 1         |            |       |              |       |   |
|                                    |  |                |              |           |            |       |              |       |   |
| FE 315                             | Soil Engineering   |                | 4            |           |            |       |              |       |   |
| WR 327                             | Technical Writing [BC]                                     |                |              | 3         |            |       |              |       |   |
| FE 470                             | Logging Mechanics  |                | 4            |           |            |       |              |       |   |
| FE 434                             | Forest Watershed Management                                |                | 4            |           |            |       |              |       |   |
|                                    |  |                |              |           |            |       |              |       |   |
| FE 316                             | Soil Mechanics   |                | 4            |           |            |       |              |       |   |
| FE 310                             | Forest Route Surveying                                     |                | 4            |           |            |       |              |       |   |
| FE 471                             | Harvesting Management                                      |                | 3            |           |            |       |              |       |   |
| FE 440                             | Forest Operations Analysis                                 |                | 3            |           |            |       |              |       |   |
| FOR 441                            | Silviculture Principles                                    | 4              |              |           |            |       |              |       |   |
| <b>+/- Subtotal</b>                |  |                |              |           |            |       |              |       |   |
|                                    | <b>Senior Year</b>   |                |              |           |            |       |              |       |   |
| FOR 330                            | Forest Resource Economics I                                |                | 1            | 3         |            |       |              |       |   |
| FE 415                             | Forest Road Engineering                                    |                | 3            |           |            |       |              |       |   |
| FE 450                             | Forest Operations Design I [WIC]                           |                | 3            |           |            |       |              |       |   |
| FE 441                             | Production Planning  |                | 3            |           |            |       |              |       |   |
| FE 480                             | Forest Engineering Practice and Professionalism            |                | 1            |           |            |       |              |       |   |
|                                    |  |                |              |           |            |       |              |       |   |
| FE 451                             | Forest Operations Design II [WIC]                          |                | 3            |           |            |       |              |       |   |
| FE 416                             | Forest Road System Management                              |                | 4            |           |            |       |              |       |   |
| FE 460                             | Forest Operations Regulations and Policy Issues            |                | 3            |           |            |       |              |       |   |
|                                    | <b>Literature and Arts [BC]</b>                            |                |              | 3         |            |       |              |       |   |
|                                    |  |                |              |           |            |       |              |       |   |
| FE 449                             | Strategic & Tactical Planning Techniques                   |                | 3            |           |            |       |              |       |   |
| FW 350                             | <b>Endangered Species, Society and Sustainability [BC]</b> |                |              | 3         |            |       |              |       | CSST – Science, Technology & Society BC |
| FE 456                             | <b>International Forestry [BC]</b>                         |                |              | 3         |            |       |              |       | CSGI – Global Issues BC                 |
|                                    | <b>Difference, Power, Discrim [BC]</b>                     |                |              | 3         |            |       |              |       |   |
| <b>+/- Subtotal</b>                |  |                |              |           |            |       |              |       |   |
| <b>Standard Curriculum Totals</b>  |  | <b>47</b>      | <b>84</b>    | <b>49</b> |            |       |              |       |   |
| <b>Adjustments from +/- Column</b> |  |                |              |           |            |       |              |       |   |
| <b>Graduation Totals</b>           |  |                |              |           |            |       |              |       |   |

Minimum Credits Required for Graduation = 180

## Detailed Program Description

### Forest Engineering / Civil Engineering Program

The FE/CE program is a unique catalog visible program that results in the graduate receiving two Bachelor of Science Degrees upon completion. Since the Civil Engineering degree is earned through the College of Engineering, students in the Dual Degree Program must be admitted to the Civil Engineering Professional Program prior to beginning the Junior Year in Civil Engineering. Applications for admission to the Civil Engineering Professional Program are submitted to the College of Engineering near the beginning of the Spring term prior to the year in which admission is desired. Further information about the admission process, admission standards, and the deadline for application can be found at the OSU College of Engineering web page.

The Forest Engineering / Civil Engineering curriculum is shown in term-by-term sequence in Table 3, and in Audit form in Table 4. The term-by-term sequence shown in Table 3 incorporates both course prerequisites and the term in which the courses are taught. There are a few cases where courses may be taken in more than one term. An example of this is the arrangement of English Composition (WR 121), Lifetime Fitness for Health (HHS 231), and Speech (COMM 111 or 114) in the Freshman year – WR 121 is scheduled alphabetically by your last name, hence you will have to take these courses in an order that fits with your term for WR 121. Further, the University does not provide enough sections of COMM 111 and 114 for all students to take one of these courses in the freshman year, hence you will most likely have to take your COMM course in a later year, and take an alternate course during your freshman year. The term by term schedule should be followed closely for all Math, Physics, Chemistry, Engineering Science (ENGR), Forestry (FOR), Wood Science and Engineering (WSE), Civil Engineering (CE), and Forest Engineering (FE) courses because there is no guarantee that courses will be taught at times that do not conflict with other required courses except during the term identified on Table 3. For this reason, **it is imperative that you consult with your advisor any time you wish to depart from the schedule given in Table 3. Missing a single course in the term in which it is offered could delay completion of your degree by an entire year.** The following list of bullets addresses specific details that you must consider as you take courses.

- **Elective Baccalaureate Core Courses (may be taken S/U)**

The University Baccalaureate Core is designed to ensure that graduates of OSU receive a liberal education. Elective Baccalaureate courses are those courses that satisfy a Baccalaureate Core requirement, but are not listed in the degree program requirements by “prefix” and “number”. The Baccalaureate Core includes many requirements that are fulfilled by courses required for the Forest Engineering degree – these courses may not be taken on an S/U basis. For example, the Math, Physical Science, Biological Science, and Social Processes and Institutions requirements are fulfilled by Differential Calculus (MATH 251), General Physics with Calculus (PH 211), Forest Biology (FOR 240), and Introduction to Microeconomics (ECON 201) respectively. From the Forest Engineering perspective, the Social Processes and Institutions required course (ECON 201) and the remaining Baccalaureate Core requirements are intended to broaden the educational experience and perspective of the Forest Engineering student. These Baccalaureate Core courses are divided into the perspective course groups, which include, Western Culture (3 cr), Cultural Diversity (3 cr), Literature and Arts (3 cr), and Difference Power and Discrimination (3 cr), and

synthesis course groups, which include Contemporary Global Issues (3 cr), and Science Technology and Society (3 cr). The perspectives courses are elective in the sense that they may be selected from a University-approved list with the provision that no more than two courses from the combined perspectives and synthesis groups may be taken from the same academic department. The synthesis courses have been selected to satisfy a Society of American Foresters accreditation requirement for a broader understanding of forest and forest system values, hence only a selected course for each requirement is shown. Some options may exist to address schedule conflicts – consult your academic advisor for specifics. Since the synthesis courses are listed by prefix and number, they must be taken for a grade.

- **Fitness (course may be taken S/U; “S” or “C” or better required)**

The Baccalaureate Core requires completion of the 2-credit course Lifetime Fitness for Health (HHS 231) and a 1-credit course from HHS 241-248 Lifetime Fitness: (various activities).

- **Communications (all courses must be graded; “C” or better required)**

A minimum of 11 credits of communication skill coursework is required for the FE/CE dual degree. English Composition (WR 121), and Technical Writing (WR 327) are required for written communication, and either Public Speaking (COMM 111) or Argument and Critical Discourse (COMM 114) is required for oral communication.

In addition, one-credit-hour each from the Forest Engineering Capstone Design Sequence (FE 450, 451) and Civil Engineering Professional Practice (CE 418) has been dedicated to written communication. These courses are listed as Writing Intensive Courses, the completion of which is part of the University Baccalaureate Core. Numerous additional communication exercises intended to build on the basic communication skills obtained from the communications courses are embedded in Forest Engineering courses at the junior (300) and senior (400) levels.

- **Using the Satisfactory /Unsatisfactory Grading System**

S/U grading can be invoked only for **ELECTIVE** Baccalaureate Core courses counted toward the two degrees. Any course not counted toward the two degrees can be taken S/U.

- **Mathematics and Statistics (all course must be graded; “C” or better required)**

Under the current requirements, a grade of “C” in all Math courses and Statistics is acceptable. The reality is that grades of “C” particularly in the first couple of Math courses may not indicate proficiency adequate to continue in the Math sequence or for success in the Engineering Science courses. You should consult with your advisor about the need to retake Math courses for which “C” is earned.

- **Basic Science (all courses must be graded; minimum grade as indicated is required)**

The Basic Science requirement includes Physics, Chemistry, Soil Science, and an array of Forest Biology and Ecology courses. A grade of “C” or better is required in all Physics and Chemistry courses, and in Crop and Soil Science [CSS 205], In other Basic Science courses [FOR courses

required in the program], a grade of “C-” is acceptable. The basic science content of all the required courses in the curriculum is given in Table 4.

- **Engineering Topics (all courses must be graded; “C” or better required)**

Engineering Science provides the bridge between the basic sciences and engineering synthesis and design. The classical Engineering Science sequence, Statics, Dynamics, and Strength of Materials, is easily identifiable as engineering science course material. Many other components of engineering science are less easily delineated, and make up only portions of engineering or other courses. In some cases, courses taught by other departments have engineering science character appropriate to Forest Engineering. For example, the application of basic mathematics to the Engineering and Management analysis of the “time value of money” is an engineering science topic even though it is presented in Forest Resource Economics I (FOR 330). Similarly, the application of mathematics and statistics to measurement of forest resource quantities is an engineering science topic even though it is presented in Forest Mensuration (FOR 321).

The heart of engineering practice is Synthesis and Design; hence Synthesis and Design are the capstone of an engineering education. Within Forest Engineering course work, the most common occurrence of engineering science topics is in the beginning of a course or course sequence, the latter portion of which is engineering synthesis or design. An example of this relationship between engineering science and design is in the Forest Operations Analysis (FE 440) and Production Planning (FE 441) sequence. Mathematics and an understanding of the process function of harvesting systems are used in Operations Analysis to break down and quantify the productivity components of a harvesting method or system – this is engineering science. Following that, in Production Planning, the results of applying mathematics to quantify the operational characteristics of harvesting are used to plan future harvesting operations – this is engineering synthesis or system design. The Engineering Design experience in the Forest Engineering/Civil Engineering program culminates in the Forest Operations Design sequence (FE 450, 451), and Civil Infrastructure Design (CE 419). These courses provide the challenge and opportunity for students to integrate components of the entire curriculum, including non-engineering courses, into the design of a timber harvesting plan (FE 450, 451) and a civil works project (CE 419) that also meets a set of financial objectives developed with consideration of the time value of money.

The Engineering Topics content of all the required courses in the curriculum is given in Table 4.

- **Civil Engineering and Forest Engineering Electives (course must be graded; “C” or better required)**

The senior year in the Dual Degree Program includes 3 credits for a Civil Engineering Design Elective, and 3 credits of either a Civil Engineering Design Elective or a Forest Engineering Elective intended to allow students a limited amount of focus on a particular Civil Engineering area of interest and a Forest Engineering area of interest. At least two credits of any Civil Engineering course taken for the Civil Engineering Design Elective must be Engineering Design credits.

An approved list of CE Design Electives is presented in Table 5.

- **Forest Engineering/Civil Engineering Program Electives for admission to the Fundamentals of Land Surveying Examination**

The Oregon State Board of Examiners for Engineering and Land Surveying [OSBEELS] has established, through Oregon Administrative Rule [OAR] 820-010-0226, the minimum educational qualifications for admission to the Fundamentals of Land Surveying Examination. These qualifications require that dual degree graduates who wish to pursue a professional career in land surveying take specific courses that satisfy the Civil Engineering and Forest Engineering Elective requirements stated above, and the requirements of OAR 820-010-0226. If you are interested in professional land surveying, please consult the listed OAR, and discuss the educational requirements with your advisor.

Notes to Tables 3 and 4 that follow:

+ Completion of course required by College of Engineering for entry into the Professional Program.  
++ Additional courses expected by the School of Civil and Construction Engineering for entry into the Professional Program. These courses are prerequisite for Civil Engineering junior year course work.

**DISCLAIMER:**

Future term data are continually updated. Check the web frequently for current information.

Table 3. Forest Engineering / Civil Engineering Curriculum Flow Chart

**Freshman Year (45)**

| Fall Term         |                                    |           | Winter Term       |   |           | Spring Term       |  |           |
|-------------------|------------------------------------|-----------|-------------------|---|-----------|-------------------|--|-----------|
| Course            |                                    | Cr        | Course            |   | Cr        | Course            |  | Cr        |
| MTH251            | Differential Calculus [BC] +       | 4         | MTH252            | Integral Calculus +                                 | 4         | MTH254            | Vector Calculus I +                    | 4         |
| CH 201            | Chemistry for Engineering Majors + | 3         | CH 202            | Chemistry for Engineering Majors ++                 | 3         | PH 211            | General Physics with Calculus [BC] +   | 4         |
| WR 121            | English Composition[BC] +          | 3         | CH 205            | Laboratory for CH 202 ++                            | 1         | COMM111           | Public Speaking [BC] +                 | 3         |
| CE 101            | CCE Engineering Orientation ++     | 1         | HHS231            | Lifetime Fitness for Health [BC]                    | 2         | COMM114           | Argument and Critical Discourse [BC] + | 3         |
| FE 101            | Introduction to Forest Engineering | 2         | HHS241            | Lifetime Fitness: (various activities) [BC]         | 1         | FOR 141           | Tree and Shrub Identification          | 3         |
|                   |                                    |           | FE 102            | Forest Engineering Problem Solving and Technology + | 3         | CSS 205           | Soils: Sustainable Ecosystems [BC] ++  | 4         |
| <b>Term Total</b> |                                    | <b>13</b> | <b>Term Total</b> |   | <b>14</b> | <b>Term Total</b> |  | <b>18</b> |

**Sophomore Year (51)**

| Fall Term         |   |           | Winter Term       |                                  |           | Spring Term       |                                     |           |
|-------------------|---|-----------|-------------------|----------------------------------|-----------|-------------------|-------------------------------------|-----------|
| Course            |   | Cr        | Course            |                                  | Cr        | Course            |                                     | Cr        |
| MTH306            | Matrix and Power Series Methods +                           | 4         | MTH256            | Applied Differential Equations + | 4         | ENGR213           | Strength of Materials +             | 3         |
| PH 212            | General Physics with Calculus +                             | 4         | PH 213            | General Physics with Calculus +  | 4         | ENGR201           | Electrical Fundamentals ++          | 3         |
| CE 201            | Engineering Graphics & Design ++                            | 3         | ENGR211           | Statics +                        | 3         | FE 308            | Forest Surveying                    | 4         |
| ST 314            | Introduction to Statistics for Engineers ++                 | 3         | Elective          | Western Culture [BC]             | 3         | ECON201           | Introduction to Microeconomics [BC] | 4         |
| FE 314            | Forest Engineering Recitation for Engineering Statistics ++ | 1         | FE 309            | Forest Photogrammetry            | 4         | FOR 240           | Forest Biology                      | 4         |
| <b>Term Total</b> |   | <b>15</b> | <b>Term Total</b> |                                  | <b>18</b> | <b>Term Total</b> |                                     | <b>18</b> |

**Forest Engineering Junior Year (46)**

| Fall Term         |  |           | Winter Term       |                             |           | Spring Term       |  |           |
|-------------------|--|-----------|-------------------|-----------------------------|-----------|-------------------|--|-----------|
| Course            |  | Cr        | Course            |                             | Cr        | Course            |  | Cr        |
| FOR 321           | Forest Mensuration                       | 5         | FE 470            | Logging Mechanics           | 4         | FOR 441           | Silviculture Principles                    | 4         |
| FE 371            | Harvesting Process Engineering           | 4         | FE 434            | Forest Watershed Management | 4         | FE 310            | Forest Route Surveying                     | 4         |
| FE 357            | GIS & Forest Engineering Applications ++ | 3         | WR 327            | Technical Writing [BC]      | 3         | Elective          | Difference, Power, and Discrimination [BC] | 3         |
| ENGR212           | Dynamics ++                              | 3         | Elective          | Literature & Arts [BC]      | 3         | FE 440            | Forest Operations Analysis                 | 3         |
| Elective          | Cultural Diversity [BC]                  | 3         | <b>Term Total</b> |                             | <b>14</b> | <b>Term Total</b> |  | <b>14</b> |
| <b>Term Total</b> |  | <b>18</b> |                   |                             |           |                   |  |           |

**Civil Engineering Junior Year (47)**

| Fall Term         |                             |           | Winter Term       |                                     |           | Spring Term       |  |           |
|-------------------|-----------------------------|-----------|-------------------|-------------------------------------|-----------|-------------------|--|-----------|
| Course            |                             | Cr        | Course            |                                     | Cr        | Course            |  | Cr        |
| CE 311            | Fluid Mechanics I           | 4         | CE 313            | Hydraulic Engineering               | 4         | CE 383            | Design of Steel Structures             | 4         |
| CE 381            | Structural Theory I         | 4         | CE 382            | Structural Theory II                | 4         | FE/FOR456         | **International Forestry [BC]          | 3         |
| CE 321            | Civil Engineering Materials | 4         | CE 392            | Introduction to Highway Engineering | 4         | ENVE321           | Environmental Engineering Fundamentals | 4         |
| FOR 330           | Forest Resource Economics I | 4         | FE 315            | Soil Engineering                    | 4         | FE 316            | Soil Mechanics                         | 4         |
| <b>Term Total</b> |                             | <b>16</b> | <b>Term Total</b> |                                     | <b>16</b> | <b>Term Total</b> |  | <b>15</b> |

**Senior Year (43)**

| Fall Term         |   |           | Winter Term       |   |           | Spring Term       |  |           |
|-------------------|---|-----------|-------------------|---|-----------|-------------------|--|-----------|
| Course            |   | Cr        | Course            |   | Cr        | Course            |  | Cr        |
| FE 415            | Forest Road Engineering                       | 3         | CE 418            | Civil Engr. Prof. Practice [WIC]              | 3         | CE 419            | Civil Infrastructure Design                          | 4         |
| FE 450            | Forest Operations Design I [WIC]              | 3         | FE 451            | Forest Operations Design II [WIC]             | 3         | FW 350            | *Endangered Species, Society and Sustainability [BC] | 3         |
| CE 481            | Reinforced Concrete I                         | 4         | FE 416            | Forest Road System Management                 | 4         | Elective          | Civil or Forest Engineering Design Elective          | 3         |
| CE 491            | Transportation Engineering                    | 3         | Elective          | Civil Engineering Design Elective             | 3         | <b>Term Total</b> |  | <b>10</b> |
| FE 441            | Production Planning                           | 3         | FE 460            | Forest Operations Regulations & Policy Issues | 3         | <b>Term Total</b> |  | <b>10</b> |
| FE 480            | Forest Engineering Practice & Professionalism | 1         | <b>Term Total</b> |   | <b>16</b> |                   |  |           |
| <b>Term Total</b> |   | <b>17</b> |                   |   |           |                   |  |           |

Table 4. Forest Engineering / Civil Engineering Program Audit Form

| Course Number            | Course Title  | Math / Science | Engr. Topics | Other | Term Taken | Grade | Substitution | + / - | Comments |
|--------------------------|---|----------------|--------------|-------|------------|-------|--------------|-------|----------|
|                          | Freshman Year   |                |              |       |            |       |              |       |          |
| MTH 251                  | Differential Calculus [BC] +                                      | 4              |              |       |            |       |              |       |          |
| CH 201                   | Chemistry for Engineering Majors +                                | 3              |              |       |            |       |              |       |          |
| CE 101                   | CCE Engineering Orientation ++                                    |                | 1            |       |            |       |              |       |          |
| FE 101                   | Introduction to Forest Engineering                                |                | 1            | 1     |            |       |              |       |          |
| WR 121                   | English Composition *[BC] +                                       |                |              | 3     |            |       |              |       |          |
| MTH 252                  | Integral Calculus +   | 4              |              |       |            |       |              |       |          |
| CH 202                   | Chemistry for Engineering Majors ++                               | 3              |              |       |            |       |              |       |          |
| CH 205                   | Chemistry for Engr Majors – lab ++                                | 1              |              |       |            |       |              |       |          |
| FE 102                   | Forest Engineering Problem Solving and Technology +               |                | 1            | 2     |            |       |              |       |          |
| HHS 231                  | Lifetime Fitness for Health *[BC]                                 |                |              | 2     |            |       |              |       |          |
| HHS 241-251              | Lifetime Fitness: Activity [BC]                                   |                |              | 1     |            |       |              |       |          |
| CSS 205                  | Soils: Sustainable Ecosystems [BC] ++                             | 4              |              |       |            |       |              |       |          |
| MTH 254                  | Vector Calculus I +   | 4              |              |       |            |       |              |       |          |
| PH 211                   | General Physics with Calculus [BC]+                               | 4              |              |       |            |       |              |       |          |
|                          | Physics Recitation (optional)                                     | (1)            |              |       |            |       |              |       |          |
| COMM111<br>or<br>COMM114 | Public Speaking [BC] +<br>or<br>Argument & Crit. Discourse [BC] + |                |              | 3     |            |       |              |       |          |
| FOR 141                  | Tree and Shrub Identification                                     | 3              |              |       |            |       |              |       |          |
| <b>+/- Subtotal</b>      |   |                |              |       |            |       |              |       |          |
| <b>Sophomore</b>         |   |                |              |       |            |       |              |       |          |
| MTH 306                  | Matrix and Power Series Methods +                                 | 4              |              |       |            |       |              |       |          |
| PH 212                   | General Physics with Calculus +                                   | 4              |              |       |            |       |              |       |          |
|                          | Physics Recitation (optional)                                     | (1)            |              |       |            |       |              |       |          |
| CE 201                   | Engineering Graphics & Design ++                                  |                |              | 3     |            |       |              |       |          |
| ST 314                   | Introduction to Statistics for Engr. ++                           | 3              |              |       |            |       |              |       |          |
| FE 314                   | Recitation for Statistics for Engineers ++                        | 1              |              |       |            |       |              |       |          |
| ENGR 211                 | Statics +   |                | 3            |       |            |       |              |       |          |
|                          | <b>Western Culture [BC]</b>                                       |                |              | 3     |            |       |              |       |          |
| MTH 256                  | Applied Differential Equations +                                  | 4              |              |       |            |       |              |       |          |
| PH 213                   | General Physics with Calculus +                                   | 4              |              |       |            |       |              |       |          |
|                          | Physics Recitation (optional)                                     | (1)            |              |       |            |       |              |       |          |
| FE 309                   | Forest Photogrammetry   |                | 4            |       |            |       |              |       |          |
| ENGR 213                 | Strength of Materials +   |                | 3            |       |            |       |              |       |          |
| ENGR 201                 | Electrical Fundamentals ++  |                | 3            |       |            |       |              |       |          |
| FE 308                   | Forest Surveying  |                | 4            |       |            |       |              |       |          |
| FOR 240                  | Forest Biology  | 4              |              |       |            |       |              |       |          |
| ECON 201                 | Introduction to Microeconomics [BC]                               |                |              | 4     |            |       |              |       |          |
| <b>+/- Subtotal</b>      |   |                |              |       |            |       |              |       |          |

| Course Number       | Course Title                                       | Math / Science | Engr. Topics | Other | Term Taken | Grade | Substitution | + / - | Comments |
|---------------------|--|----------------|--------------|-------|------------|-------|--------------|-------|----------|
|                     | FE Junior Year                                     |                |              |       |            |       |              |       |          |
| FOR 321             | Forest Mensuration                                 |                | 2            | 3     |            |       |              |       |          |
| FE 357              | GIS and Forest Engineering Appl. ++                |                | 2            | 1     |            |       |              |       |          |
| FE 371              | Harvesting Process Engineering                     |                | 4            |       |            |       |              |       |          |
| ENGR 212            | Dynamics ++  |                | 3            |       |            |       |              |       |          |
|                     | <b>Cultural Diversity [BC]</b>                     |                |              | 3     |            |       |              |       |          |
| FE 470              | Logging Mechanics                                  |                | 4            |       |            |       |              |       |          |
| FE 434              | Forest Watershed Management                        |                | 4            |       |            |       |              |       |          |
| WR 327              | Technical Writing [BC]                             |                |              | 3     |            |       |              |       |          |
|                     | <b>Literature &amp; Arts [BC]</b>                  |                |              | 3     |            |       |              |       |          |
| FE 310              | Forest Route Surveying                             |                | 4            |       |            |       |              |       |          |
| FE 440              | Forest Operations Analysis                         |                | 3            |       |            |       |              |       |          |
| FOR 441 or FOR 443  | Silviculture Principles<br>Silvicultural Practices | 4              |              |       |            |       |              |       |          |
|                     | <b>Difference Power Discrim [BC]</b>               |                |              | 3     |            |       |              |       |          |
| <b>+/- Subtotal</b> |  |                |              |       |            |       |              |       |          |
|                     | <b>CE Junior Year</b>                              |                |              |       |            |       |              |       |          |
| CE 381              | Structural Theory I                                |                | 4            |       |            |       |              |       |          |
| CE 311              | Fluid Mechanics I                                  |                | 4            |       |            |       |              |       |          |
| CE 321              | Civil Engineering Materials                        |                | 4            |       |            |       |              |       |          |
| FOR 330             | Forest Resource Economics I                        |                | 1            | 3     |            |       |              |       |          |
| CE 382              | Structural Theory II                               |                | 4            |       |            |       |              |       |          |
| CE 313              | Hydraulic Engineering                              |                | 4            |       |            |       |              |       |          |
| FE 315              | Soil Engineering                                   |                | 4            |       |            |       |              |       |          |
| FE/FOR 456          | <b>International Forestry [BC]</b>                 |                |              | 3     |            |       |              |       |          |
| CE 383              | Design of Steel Structures                         |                | 4            |       |            |       |              |       |          |
| FE 316              | Soil Mechanics                                     |                | 4            |       |            |       |              |       |          |
| CE 392              | Introduction to Highway Engineering                |                | 4            |       |            |       |              |       |          |
| ENVE 321            | Environmental Engineering Fundamentals (WIC)[BC]   |                | 4            |       |            |       |              |       |          |
| <b>+/- Subtotal</b> |  |                |              |       |            |       |              |       |          |

| Course Number                      | Course Title   | Math / Science | Engr. Topics | Other | Term Taken | Grade | Substitution | + / - | Comments |
|------------------------------------|--|----------------|--------------|-------|------------|-------|--------------|-------|----------|
|                                    | Senior   |                |              |       |            |       |              |       |          |
| CE 481                             | Reinforced Concrete I                                      |                | 4            |       |            |       |              |       |          |
| CE 491                             | Transportation Engineering                                 |                | 3            |       |            |       |              |       |          |
| FE 415                             | Forest Road Engineering                                    |                | 3            |       |            |       |              |       |          |
| FE 441                             | Production Planning  |                | 3            |       |            |       |              |       |          |
| FE 450                             | Forest Operations Design I [WIC]                           |                | 3            |       |            |       |              |       |          |
| FE 480                             | FE Practice and Professionalism                            |                | 1            |       |            |       |              |       |          |
|                                    | CE Design Elective   |                | 3            |       |            |       |              |       |          |
| CE 418                             | Civil Engineering Professional Practice[WIC]               |                | 3            |       |            |       |              |       |          |
| FE 416                             | Forest Road System Management                              |                | 4            |       |            |       |              |       |          |
| FE 460                             | Forest Operation Regulations and Policy Issues             |                | 3            |       |            |       |              |       |          |
| FE 451                             | Forest Operations Design II [WIC]                          |                | 3            |       |            |       |              |       |          |
| CE 419                             | Civil Infrastructure Design [WIC]                          |                | 4            |       |            |       |              |       |          |
| FW 350                             | <b>Endangered Species, Society and Sustainability [BC]</b> |                |              | 3     |            |       |              |       |          |
|                                    | Civil or Forest Engineering Design Elective                |                | 3            |       |            |       |              |       |          |
| <b>+/- Subtotal</b>                |  |                |              |       |            |       |              |       |          |
| <b>Standard Curriculum Totals</b>  |  | 58             | 127          | 47    |            |       |              |       |          |
| <b>Adjustments from +/- Column</b> |  |                |              |       |            |       |              |       |          |
| <b>Graduation Totals</b>           |  |                |              |       |            |       |              |       |          |

Minimum Credits Required for Graduation = 232

Table 5. Approved Civil Engineering Design Electives

| Course # | Course Title                         | Credit Distribution |            |       |
|----------|--------------------------------------|---------------------|------------|-------|
|          |                                      | Engr. Sci.          | Engr. Des. | Other |
| CE 411   | Ocean Engineering                    | 1                   | 3          |       |
| CE 415   | Coastal Infrastructure               | 1                   | 2          |       |
| CE 417   | Hydraulic Engineering Design         |                     | 4          |       |
| CE 420   | Engineering Planning                 | 1                   | 3          |       |
| CE 463   | Control Surveying                    | 1                   | 3          |       |
| CE 469   | Property Surveys                     |                     | 3          |       |
| CE 471   | Foundations for Structures           |                     | 4          |       |
| CE 476   | Soil and Site Improvement            | 1                   | 2          |       |
| CE 480   | Selected Topics in Structural Design |                     | 3          |       |
| CE 482   | Masonry Design                       | 1                   | 3          |       |
| CE 483   | Bridge Design                        |                     | 3          |       |
| CE 486   | Prestressed Concrete                 |                     | 3          |       |
| CE 492   | Pavement Structures                  |                     | 3          |       |
| CE 495   | Traffic Operations and Design        | 1                   | 2          |       |
| WSE 458  | Wood Design                          |                     | 4          |       |