A revision to the current course drop policy is proposed. Currently, students can drop courses into the ninth week of the semester with no evidence of having been enrolled in the course at all. The following policy revision addresses the academic and accounting issues that are created by the current policy:

a. students purposefully over-enroll in courses about which they are uncertain, thereby precluding others from enrolling, then drop the course after the Course Add deadline a full nine weeks into the semester, thus wasting instructional resources and reducing efficiency in allocating classroom resources;

b. students and advisors are potentially unaware of the financial ramifications of dropping their course load below full-time status with respect to both the present and future semesters;

c. faculty and departments do not receive appropriate credit for the actual number of students who take their course more than halfway through the semester; and

d. students, prospective employers and prospective graduate programs do not have an accurate reflection of the student’s academic work on the transcript.

The proposal is to modify the current Course Drop policy. The revised policy will be as follows:

Students may drop courses up until the last day to add as set by the Registrar in the academic calendar using an add/drop form. Dropped courses during this period will be completely removed from the transcript when dropped on or before this deadline.

Deadlines and actions to be taken after the last day to add deadline are:

After the last day to add, students will use a Course Withdrawal Form to drop all courses. This form will require the signature of the Academic Advisor, Instructor and Student. This form includes a very specific statement advising students that there may be potential financial aid consequences if their registration status falls below full-time status, and it advises them to confirm their status with Financial Aid. Students indicate via their signature their understanding of those consequences.

Last day to add – Week 4: After the last day to add (as per the academic calendar), students may drop a course without record of registration, until the end of the 4th week of classes.

Weeks 5-9: Students who withdraw from a course after the last day of the 4th week and by the last day of the 9th week will receive a W (Withdraw) grade on his or her permanent transcript, and the student will remain on the course roster. The W grade will not affect the GPA, and is not replaceable with an R grade.

Weeks 10-14: Students who withdraw from a course after the last day of the 9th week and by the last day of the 14th week will receive a W or a WF (withdraw failing) on his or her permanent transcript, and the student will remain on the course roster. The WF grade will not count in the student’s GPA. W and WF grades are not be replaceable with an R grade. The W (when assigned after the last day of the 9th week) and WF grade will be assigned by the instructor at the end of the semester.
Request for Individual Course Withdrawal
Office of the Registrar - 111 Bray Hall

Date: __________________________

Student Name: __________________________

Student ID#: __________________________

Permanent Address: 

<table>
<thead>
<tr>
<th>Street Address and Apartment Number</th>
<th>City</th>
<th>State or Province</th>
<th>Zip or Post Code</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Home Phone: __________________________ Cell Phone: __________________________

SU e-Mail: __________________________ Alternate e-Mail: __________________________

Course Withdrawal Request:

I request that I be withdrawn from the following courses, with the understanding that I may elect to withdraw from an individual course at any time between the end of the 4th week of the semester, and the end of the 14th week of the semester in accordance with the following policy (precise deadline dates are listed in the ESF Academic Calendar). **ESF Course Withdrawal Policy**: Between the end of the 4th week and the end of the 9th week, a grade of "W" will be recorded for the course on a student's transcript, with no effect on a student's semester or cumulative GPA. Between the end of the 9th and the end of the 14th week, the instructor of record may elect to assign a grade of "W," or "WF" if a student is deemed to be failing the course at the time of withdrawal. Grades of both "W" and "WF" will have no impact on a student's semester or cumulative GPA.

I have read the ESF Course Withdrawal Policy provided to me on this form and consulted with the appropriate college offices to ensure that I fully understand the need to be registered for at least 12 credit hours to maintain "full-time" status, as well as the potential financial aid consequences of falling below a full-time course load.

Student Signature: __________________________

Course Prefix & Number (i.e. ESF 301): __________________________ Course Name: __________________________ Credit Hours: __________________________

Instructor Signature: __________________________

Course Prefix & Number (i.e. ESF 301): __________________________ Course Name: __________________________ Credit Hours: __________________________

Instructor Signature: __________________________

Course Prefix & Number (i.e. ESF 301): __________________________ Course Name: __________________________ Credit Hours: __________________________

Instructor Signature: __________________________

Advisor Approval:

For your course withdrawal to take effect, you **MUST** obtain your advisor's approval signature and return this completed form to the Office of the Registrar, 111 Bray Hall prior to the published Withdrawal Deadline: Advisor Signature: __________________________

OIGS Policy Proposal 2012.2

Background:

Currently, ESF has a policy regarding the broad assignment of course numbers or numbering systems, however, there is little specific guidance provided for other aspects of the process used to name, number or title new courses. In particular, there have been recent proposals for new course prefixes, often without apparent necessity.

Proposed Policies regarding course prefixes, naming, and numbering:

Course Prefixes
Typically, each department or division uses a single prefix for all courses offered within the corresponding department or division (i.e., Environmental Studies uses exclusively the prefix “EST”). Where a distinct program exists as a separate or semi-autonomous unit within a department or division, a secondary prefix may be designated and used by that program (i.e., the Environmental Writing Program with Environmental Studies has developed and use the EWP prefix). A new prefix should only be created if all of the following conditions exist:

- The program area for which the new prefix is intended represents a significant departure from the core programmatic offerings of the department.
- A minimum of 6 courses must be created or re-designated to constitute a new prefix area
- A distinct, Committee on Curriculum approved academic program must accompany the creation of a new prefix, such as a new major, minor, or certificate of advanced study.

All proposals for new course prefixes shall be approved by Faculty Governance.

Course Numbering
Course Numbering must conform to the following system:

- **100-499** Undergraduate courses for which no graduate credit may be given. Suggested hierarchies for undergraduate courses are as follows:
  - o **100** level courses: introductory level courses with limited or no prerequisites, and typically offered within the freshman year in most curricula
  - o **200** level courses: lower division curricular foundation courses typically offered within the sophomore year in most curricula
  - o **300** level courses: upper division courses typically offered within the junior or senior year in most curricula
  - o **400** level courses: upper division courses with significant specialized content, upper division prerequisites, and typically offered within the senior year in most curricula
- **500-599** Graduate courses designed expressly for areas of specialization in post-baccalaureate programs. Qualified under-graduate students may enroll with permission of the instructor.
- **600-699** Graduate courses designed expressly for advanced levels of specialization. Undergraduate students with a cumulative grade point average of 3.000 or better may enroll in these courses with an approved petition.
- **700-999** Advanced graduate level courses for which no undergraduate students may register.
- Shared resources courses, designated as 400/500, 300/500, or 400/600, are designed when the topic coverage of both courses is the same. Separate course
sylabi are developed expressly differentiating the requirements and evaluative
criteria between the undergraduate course and the graduate course. No type of
cross listing may be offered unless approved by the ESF faculty.
• Course numbers are officially assigned by the College Registrar.

Course Names
Courses should be named with a priority placed on ease of identifying content, balanced by
a need for brevity. The primary limiting factor with regard to course names is the length
limit within the MySlice registration system of 26 characters. Names within the college
catalog may be longer (currently as many as 85 characters), however, thought should be
given to naming courses in a clear, brief, and concise manner, and whenever possible, with
fewer than 26 characters.
OIGS Policy Proposal 2012.3

Background:

The college currently has no policy regarding student feedback or the timely return of assignments, exams, or projects.

Proposed Policy Statement:

Faculty shall provide all students with timely and appropriate feedback regarding their performance and progress toward meeting prescribed learning outcomes on all assigned course work, projects, and examinations.

Rationale for the development of a policy requiring the timely review of student work and provision of appropriate feedback:

“Effective and high quality feedback is a key element of quality teaching” and among the most important attributes of effective feedback is providing it in a timely fashion (Rowe, 2007; Banger-Drowns, Kulik, Kulik, & Morgan, 1991). If students either do not receive feedback, or they receive it too late to prove useful in the coursework they are engaging, we as faculty are failing in our obligation to provide a setting conducive to learning.

Guidelines for Implementation:

“Timeliness” is a necessarily vague qualitative measure and may be interpreted broadly in different settings or as applied to different types of courses or assignments. The following minimally quantitative and conservative guidelines may provide a frame of reference for some typical situations common in ESF courses:

- Short homework assignments: 1 week to 10 days
- Quizzes: up to 10 days
- Laboratory assignments: up to 2 weeks
- Major exams: up to 2 weeks
- Major projects or papers: up to 2-3 weeks
- Thesis or dissertation drafts typically +/- 2 weeks, up to 30 days

References:


Date: March 29, 2012
Department: Environmental Studies
Curriculum Title: Certificate of Graduate Studies in Environmental Decision Making

☐ New curriculum and/or degree program OR ☒ Changes in existing curriculum (check all that apply):
☐ new program title
☐ revised courses
☒ new course sequence
☐ new courses added
☒ change in total cr. hrs.
☐ new program objectives
☐ new courses added
☐ new accreditation
☐ new assessment plan
☐ other significant change

Justification Narrative: Please provide an explanatory narrative outlining the need or rationale for the new curriculum or program, or justifying the need to significantly change an existing curriculum (i.e., addressing emerging or changing societal demand, addressing changing technology, focusing on a new interdisciplinary body of knowledge, etc.)

The primary audience for this certificate is the Maxwell School MPA students. Their administrative representative contacted us to let us know that the current requirements preclude many students from taking the Certificate and that a few changes would make it accessible to many more students. While reviewing the requirements, we noted a potential market for the Certificate with ESF students as well so this adjustment includes opening the Certificate to ESF students. The changes outlined here include a reduction from 15 to 12 credits, an allowance of 6 credits from SU (approved by the Dean of the ESF Graduate School), and an adjustment to the course requirements that more clearly links the courses to the Certificate topic.

Institutional Impact:

Anticipated Enrollment: 8-10 per semester Change from existing condition: +7-9

New Faculty or Staffing Requirements: None

New Technology and Classroom Resource Demands: None

New Computing Resources Requirements: None

New Accreditation Requirements: None

New Assessment Requirements (explain & describe): None
<table>
<thead>
<tr>
<th>Requirement</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Library Resources Requirements:</td>
<td>None</td>
</tr>
<tr>
<td>New Transportation Requirements:</td>
<td>None</td>
</tr>
<tr>
<td>New Forest Properties or Field Practicum Facilities Required:</td>
<td>None</td>
</tr>
</tbody>
</table>

Impacts on other Departments at ESF (please obtain and attach response from affected departments):

No Change

Impacts on Admissions (particularly transfer requirements and articulation agreements; please obtain and attach response from Admissions if an impact is anticipated)

No Change

List courses taught outside the Department at ESF:

Option courses include FOR 689, FOR 687

List courses taught outside the Department at SU:

<table>
<thead>
<tr>
<th>Description</th>
<th>None required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory Instruction credit hours at SU required per student in this curriculum</td>
<td></td>
</tr>
<tr>
<td>Accessory Instruction credit hours required per semester by this curriculum</td>
<td></td>
</tr>
<tr>
<td>Change in Accessory Instruction needs over current programs and curricula</td>
<td>No change</td>
</tr>
</tbody>
</table>

Option courses include FOR 689, FOR 687

LAW 716, LAW 865, PPA 775, PPA 777, PPA 730

None required

None required

No change

Catalog Curriculum Narrative:

Please provide a narrative description of the program, the broad program objectives and learning outcomes, and a curriculum course outline using the precise format proposed for/or currently used in the ESF catalog (if revising an existing program or curriculum proposal, please attach a copy of the original MS Word file with revisions shown in “track changes”):

Catalog text with track changes is attached.

Curriculum Transition Plan:

Please provide a narrative description of your plan for transitioning from your existing curriculum to the proposed new curriculum. Please provide specific dates for implementing curriculum changes, overlap periods where old and new curricula may exist simultaneously, and final phase out of old curricula. Please also include impacts and mitigating considerations for students in mid-program during implementation, impacts of changes in semester delivery of existing courses, addition of new courses within a particular semester, etc.

If approved this spring, the handbook will be updated immediately to reflect the changes and distributed this summer (2012) to our Maxwell School contacts and made available online. We will request to make an announcement through the graduate student list serve about the availability of the Certificate to ESF
graduate students at the start of the Fall 2012 semester. No students are currently enrolled in this Certificate so there is no need to retain the old curriculum.
Date: March 26, 2012
Department: Sustainable Construction Management and Engineering
Curriculum Title: Construction Management

☐ New curriculum and/or degree program  OR  X Changes in existing curriculum(check all that apply):

☐ new program title  ☐ new courses added  ☐ new accreditation
☐ revised courses  ☐ change in total cr. hrs.  ☐ new assessment plan
X new course sequence  ☐ new program objectives  ☐ other significant change

Justification Narrative: please provide an explanatory narrative outlining the need or rationale for the new curriculum or program, or justifying the need to significantly change an existing curriculum (i.e. addressing emerging or changing societal demand, addressing changing technology, focusing on a new interdisciplinary body of knowledge, etc.)

A major revision to the Construction Management curriculum was made for the 2010-2011 school year. At the time the curriculum proposal was developed teaching assignments were unresolved. Certain course offerings (by semester) have never matched the catalog sequence. In working to resolve those discrepancies, the following results were obtained:

1) Improved balance (by semester) of upper division electives.
2) Improved first-semester experience for Freshman
3) Improved linkage between CME 255 and CME 343

Institutional Impact:

Anticipated Enrollment: 100 per semester       Change from existing condition: 0

New Faculty or Staffing Requirements: None

New Technology and Classroom Resource Demands: None

New Computing Resources Requirements: None (since the present catalog sequence was not implemented)

New Accreditation Requirements: None (the program is currently not accredited)

New Assessment Requirements (explain & describe): None (since the present catalog sequence was not implemented)
New Library Resources Requirements: None (since the present catalog sequence was not implemented)

New Transportation Requirements: None (since the present catalog sequence was not implemented)

New Forest Properties or Field Practicum Facilities Required: None

Impacts on other Departments at ESF (please obtain and attach response from affected departments): No direct impact on other departments, students from other departments in the Construction Management and Sustainable Construction minors have been informed of the sequence changes.

Impacts on Admissions (particularly transfer requirements and articulation agreements; please obtain and attach response from Admissions if an impact is anticipated): Communication with admissions has been ongoing to try to assist our transfers with sequence requirements.

List courses taught outside the Department at ESF: No change (GENEDU (2), CLL 190, FCH 150/151, APM 105, FOR 207, CLL 290, PHY 211/221, FOR 360, APM 106, ERE 371, APM 391, CIE 337)

List courses taught outside the Department at SU: No change (CIE 337, PHY 211/221)

- Accessory Instruction credit hours at SU required per student in this curriculum: No change (8)
- Accessory Instruction credit hours required per semester by this curriculum: No change (1)
- Change in Accessory Instruction needs over current programs and curricula: None

Catalog Curriculum Narrative:

Please provide a narrative description of the program, the broad program objectives and learning outcomes, and a curriculum course outline using the precise format proposed for or currently used in the ESF catalog (if revising an existing program or curriculum proposal, please attach a copy of the original MS Word file with revisions shown in “track changes”):

Curriculum Transition Plan:

Please provide a narrative description of your plan for transitioning from your existing curriculum to the proposed new curriculum. Please provide specific dates for implementing curriculum changes, overlap periods where old and new curricula may exist simultaneously, and final phase out of old curricula. Please also include impacts and mitigating considerations for students in mid-program during implementation, impacts of changes in semester delivery of existing courses, addition of new courses within a particular semester, etc.
There will be no change in the semester that any courses are offered. Advising sheets have already been created to assist advisors working with students on the 2010-2011 and 2011-2012 curricula.
<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td><strong>CME 202 Intro.to Professional Communications</strong></td>
<td><strong>APM 105 Calculus 1</strong></td>
</tr>
<tr>
<td></td>
<td><strong>CLL 190 Writing and the Environment</strong></td>
<td><strong>CME 215 Sustainable Construction</strong></td>
</tr>
<tr>
<td></td>
<td><strong>FCH 150 General Chemistry I</strong></td>
<td><strong>FOR 207 Introduction to Economics/Economics</strong></td>
</tr>
<tr>
<td></td>
<td><strong>FCH 151 General Chemistry Lab I</strong></td>
<td><strong>CLL 290 Writing, Humanities &amp; Environment</strong></td>
</tr>
<tr>
<td></td>
<td><strong>CME 132 Orientation Seminar</strong></td>
<td><strong>APM 202 Intro to Professional Communications From Fresh Sp</strong></td>
</tr>
<tr>
<td></td>
<td><strong>APM 104 PreCalc OR Elective</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Elective</strong></td>
<td><strong>GENEDU General Education Course From Soph Fa</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>Total Credits</strong></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

| Sophomore| **GENEDU General Education Course**                                          | **APM 106 Calculus 2**                                                        |
|          | **PHY 211 General Physics I**                                                 | **CME 342 Light Construction**                                                |
|          | **PHY 221 General Physics Lab I**                                             |                                                                                |
|          | **APM 106 Calculus 2**                                                        | **FOR 360 Principles of Management from Junior Fa**                           |
|          | **CME 342 Light Construction**                                                |                                                                                |
|          | **Total Credits**                                                             | **Total Credits**                                                             |
|          | 17                                                                            | 17                                                                            |

**2011-2012**

**FRESHMAN YEAR**

**Fall Semester**

- CME 202 Intro.to Professional Communications
- CLL 190 Writing and the Environment
- FCH 150 General Chemistry I
- FCH 151 General Chemistry Lab I
- CME 132 Orientation Seminar
- APM 104 PreCalc OR Elective
- Elective
- Total Credits: 17

**Spring Semester**

- APM 105 Calculus 1
- CME 215 Sustainable Construction
- FOR 207 Introduction to Economics/Economics
- CLL 290 Writing, Humanities & Environment
- GENEDU General Education Course
- Total Credits: 16

**SOPHOMORE YEAR**

**Fall Semester**

- GENEDU General Education Course
- PHY 211 General Physics I
- PHY 221 General Physics Lab I
- GENEDU General Education Course
- APM 106 Calculus 2
- CME 342 Light Construction
- Total Credits: 17

**Spring Semester**

- APM 106 Calculus 2
- CME 342 Light Construction
- Total Credits: 17

**Proposed for 2012-13**

**FRESHMAN YEAR**

**Fall Semester**

- GENEDU General Education Course From Fresh Sp
- CLL 190 Writing and the Environment
- FCH 150 General Chemistry I
- FCH 151 General Chemistry Lab I
- CME 132 Orientation Seminar
- APM 104 PreCalc OR Elective
- Elective
- Total Credits: 17

**Spring Semester**

- APM 105 Calculus 1
- CME 215 Sustainable Construction
- FOR 207 Introduction to Economics/Economics
- CLL 290 Writing, Humanities & Environment
- GENEDU General Education Course From Soph Fa
- Total Credits: 17

**SOPHOMORE YEAR**

**Fall Semester**

- Elective
- PHY 211 General Physics I
- PHY 221 General Physics Lab I
- FOR 360 Principles of Management from Junior Fa
- APM 106 Calculus 2
- CME 342 Light Construction
- Total Credits: 17

**Spring Semester**

- APM 106 Calculus 2
- CME 342 Light Construction
- Total Credits: 17
<table>
<thead>
<tr>
<th>Elective</th>
<th>3</th>
<th>Elective</th>
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<tbody>
<tr>
<td>GENEDU General Education Course</td>
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<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>CME 255 Plan Interpretation and Quantity Takeoff</td>
<td>3</td>
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<tr>
<td>Total Credits:</td>
<td>16</td>
<td>Total Credits:</td>
<td>16</td>
</tr>
</tbody>
</table>

**JUNIOR YEAR**

**Fall Semester**
- CME 331 Construction Safety
- CME 387 Renewable Materials for Sustainable Const.
- ERE 371 Surveying for Engineers
- FOR 360 Principles of Management
- CME 305 Sustainable Energy Systems for Buildings

Total Credits: 16

**Spring Semester**
- CME 331 Construction Safety
- CME 387 Renewable Materials for Sustainable Const.
- ERE 371 Surveying for Engineers
- FOR 360 Principles of Management
- CME 305 Sustainable Energy Systems for Buildings

Total Credits: 15

**SENIOR YEAR**

**Fall Semester**
- CIE 337 Geotechnical Engineering
- CME 335 Cost Engineering
- CME 497 Senior Seminar
- CME 453 Construction Planning and Scheduling
- CME 422 Composite Materials for Sustainable Const.
- Elective From Senior Sp

Total Credits 16

**Spring Semester**
- CIE 337 Geotechnical Engineering
- CME 335 Cost Engineering
- CME 497 Senior Seminar
- CME 453 Construction Planning and Scheduling
- Elective From Senior Sp

Total Credits 15
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME 454 Construction Project Management</td>
<td>3</td>
</tr>
<tr>
<td>CME 455 Construction Contracts &amp; Specs</td>
<td>3</td>
</tr>
<tr>
<td>CME 405 Building Information Modeling for Const. Mgmt. (new)</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>CME 304 Environmental Performance Measures for Buildings From</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits: 15

Total Program Credits: 128
Department of Sustainable Construction Management and Engineering

SUSAN E. ANAGNOST, Chair
204 Baker Laboratory, 315-470-6880; FAX 315-470-6879
www.esf.edu/scme/

Participating Faculty

ANAGNOST, Chair, (Wood Anatomy, Microscopy, Biodegradation of Wood, Micro-technique); CROVELLA (Residential Construction, Sustainable Construction Management); KYANKA (Construction, Applied Mechanics, Engineering Design); MEYER (Wood Properties, Wood Utilization, Anatomy); MORSI-HUSSEIN (Construction Engineering, Applied Mechanics, Structures); SMITH, J. (Cost Engineering, Construction Management, Sustainable Construction); SMITH, W. (Wood Preservation and Protection, Wood Moisture Relations and Drying, Composite Products, Manufacturing and Processing, Marketing); TISS (Construction Safety, Estimating, Planning and Scheduling, Construction Management)

The Department of Sustainable Construction Management and Engineering offers a bachelor of science in construction management and graduate education in Sustainable Construction Management and Wood Science leading to the master of science, master of professional studies, and doctor of philosophy degrees.

The degree programs emphasize principles and practices of sustainable construction. By learning sustainable construction and construction management, the use of renewable resources in construction, and methods to ensure energy efficiency, ESF graduates can literally build a sustainable future. They can also learn how to produce products from wood, be it furniture, construction material, or utility poles — in the most energy efficient way possible. Students take classes, labs and lectures in the newly renovated Baker Laboratory that features high-tech lecture halls, pilot-scale manufacturing equipment for building materials and wood products, an accredited engineering test facility, and computer labs equipped with the latest commercial software for planning, scheduling, project management and estimating. Instruction is tailored to the interests of individual students through the selection of electives.
At the undergraduate level, two concentration areas are available: wood products engineering and sustainable construction and renewable materials. Minors that enhance business skills in general management studies, marketing, and entrepreneurship are available for qualified students. Students interested in these or other minors should meet with their advisors as soon as possible.

Professional growth of students is stimulated by active membership in student chapters of professional construction and wood science organizations. Students are encouraged to join at least one organization that is of particular interest to them. Student organizations associated with our department include the Green Construction Group (formerly the Student Construction Association) affiliated with National Association of Home Builders, The Associated General Contractors of America and General Building Contractors of New York State, and the Forest Products Society student chapter.

Many students who enter the undergraduate program in construction management are transfer students. Graduates of A.S. programs in liberal arts, math/science, and engineering/science as well as A.A.S. programs in architectural, civil, construction, mechanical, and wood technologies are encouraged to apply. Students with or without two-year degrees who meet all lower-division requirements and have 62 credits in acceptable coursework transfer as juniors for a four-semester program. Transfer students who have completed pre-calculus, but have not completed calculus, chemistry and/or physics or have not met most of their general education requirements generally finish in five or six semesters.

**TOP**

**Bachelor of Science in Construction Management**

The construction industry represents about ten percent of the world’s gross domestic product, while the entire construction industry represents 20 percent of the nation’s GDP. The U.S. Bureau of Labor Statistics projects employment in the construction industry will increase by 17 percent between 2008 and 2018. With more construction companies bidding on jobs, organizations with the best-prepared professionals using the latest technology are the most successful. This competition applies not only to contractors, but also many others involved in construction operations such as engineers, human resource managers, and material and equipment suppliers. People engaged in this industry must have state-of-the-art skills and knowledge to thrive.

The construction management degree prepares students for management careers in the construction industry. The objectives of the program are to provide the management skills to effectively deliver construction projects in a timely manner, within budget, safely and in accordance with the clients’ objectives; to study the various methods used to take a design into the field and construct a quality structure in the most efficient and effective manner with minimal environmental impacts; and to provide an understanding of basic engineering and environmental considerations in construction.

The curriculum offers several opportunities for professional certification or for obtaining professional credentials. Through successful completion of course requirements, students obtain the OSHA 30-hour card in Construction Safety. During their last semester, students take the Associate Constructor Examination, part 1 of the two-step examination process to
become a Certified Professional Constructor. Students learn the fundamentals of the various rating systems for buildings (LEED, Green Globes, and others), which can prepare them to take the LEED AP exam. Students interested in pursuing a career in engineering have coursework that partially fulfills the preparation required for the fundamentals in engineering examination.

The core of the curriculum includes topics in construction management: light construction, construction safety, construction equipment, construction methods, building codes and zoning, contracts and specifications, planning and scheduling, estimating, construction project management, applied structural analysis, soil mechanics, composite materials, and computer applications including building information modeling (BIM). Aspects of green construction and sustainability are incorporated into these courses. Students learn the properties and behavior of construction materials: steel, concrete, wood and engineered wood products, as well as non-traditional materials, and the analysis of various structural components and systems. The curriculum also includes courses that address the expanding field of sustainable construction and the "greening" of the industry. Students are introduced to sustainable construction in a sophomore-level overview course. More advanced courses include renewable materials for sustainable construction, energy systems in buildings, and environmental performance of buildings as related to certification programs.

Environmental and safety aspects of construction are addressed in the program with course topics on workplace safety, environmental impact evaluation, and building codes that cover structural, fire, and hazardous material requirements. Emphasis on environmental and personal safety includes asbestos mitigation, noise pollution, air monitoring and sampling techniques.

A concentration in wood products engineering provides additional courses in the manufacturing, properties, and marketing of wood products. Wood is a premier sustainable material for manufacturing, building and construction. It is renewable and produced from a sustainable natural resource. Wood is strong, lightweight, economical, long lasting and attractive and is made into countless products desired by society. In combination with required coursework (renewable materials for sustainable construction, composite products, applied structures) students are prepared for employment in wood products industries, as well as construction management firms and building materials companies.

Graduates of the construction management program are well prepared for careers in a very challenging and dynamic field. Positions held by alumni include construction project manager, safety director, OSHA compliance officer, construction engineer, estimator, company executive, and planner/scheduler. Students who choose the concentration elective coursework in wood products engineering are also prepared for employment in wood products manufacturing and marketing.

Students may enter the bachelor of science program as first-year students or as transfer students. Students who are preparing to transfer to ESF as juniors must have earned at least 62 credits of college coursework, in courses comparable to the lower-division course requirements.
Undergraduate Program Requirements

Lower Division Required Courses (45 or 48 credits)

*Students who take pre-calculus receive 48 credits; students who do not take pre-calculus receive 45 credits of required lower division courses.*

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME 132 Orientation Seminar: Wood Products Engineering</td>
<td>1</td>
</tr>
<tr>
<td>APM 105 Calculus I</td>
<td>G 4</td>
</tr>
<tr>
<td><em>Meets the requirements for general education skills and knowledge area. A complete listing of courses that meet general education standards established by SUNY is listed in Undergraduate Education.</em></td>
<td></td>
</tr>
<tr>
<td>APM 106 Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>CME 202 Introduction to Professional Communications</td>
<td>3</td>
</tr>
<tr>
<td>EWP 190 Writing and the Environment</td>
<td>G 3</td>
</tr>
<tr>
<td>EWP 290 Writing, Humanities and the Environment</td>
<td>G 3</td>
</tr>
<tr>
<td>FCH 150/151 General Chemistry I and Laboratory</td>
<td>G 4</td>
</tr>
<tr>
<td>FOR 207 Introduction to Economics</td>
<td>G 3</td>
</tr>
<tr>
<td>CME 255 Plan Interpretation and Quantity Takeoff</td>
<td>3</td>
</tr>
<tr>
<td>CME 215 Sustainable Construction</td>
<td>3</td>
</tr>
<tr>
<td>CME 226 Statics and Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CME 342 Light Construction</td>
<td>3</td>
</tr>
<tr>
<td>CME 306 Engineering Materials for Sustainable Construction</td>
<td>3</td>
</tr>
<tr>
<td>FOR 360 Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>PHY</td>
<td>211/221</td>
</tr>
<tr>
<td>-----</td>
<td>---------</td>
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<td></td>
</tr>
</tbody>
</table>

**Lower Division Electives (12 or 15 credits; 12 credits if a student is required to take APM 104 Precalculus)**

Students may use elective credits to pursue a concentration in Wood Products Engineering or Sustainable Construction and Renewable Materials.

Electives

Required for students who enter as transfer students.

12 or 15

**General Education courses (6 credits).** Students must select two additional general education courses from two of the following categories: American History, Other World Civilizations, Western Civilization, and the Arts:

<table>
<thead>
<tr>
<th>General Education Course: American History, Other World Civilizations, Western Civilization, or the Arts</th>
<th>G 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Course: American History, Other World Civilizations, Western Civilization, or the Arts</td>
<td>G 3</td>
</tr>
</tbody>
</table>

Excluding the category chosen above.

**Upper Division Required Courses (53 credits):**

<table>
<thead>
<tr>
<th>CME</th>
<th>255</th>
<th>Plan Interpretation and Quantity Takeoff</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM</td>
<td>391</td>
<td>Introduction to Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>CIE</td>
<td>337</td>
<td>Soil Mechanics and Foundations I</td>
<td>4</td>
</tr>
<tr>
<td>ERE</td>
<td>371</td>
<td>Surveying for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>FOR</td>
<td>360</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>CME</td>
<td>304</td>
<td>Environmental Performance Measures for Buildings</td>
<td>3</td>
</tr>
<tr>
<td>CME</td>
<td>305</td>
<td>Sustainable Energy Systems for Buildings</td>
<td>3</td>
</tr>
<tr>
<td>CME</td>
<td>331</td>
<td>Construction Safety</td>
<td>3</td>
</tr>
<tr>
<td>CME</td>
<td>335</td>
<td>Cost Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CME</td>
<td>343</td>
<td>Construction Estimating</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Credits</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>CME 387</td>
<td>Renewable Materials for Sustainable Construction</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 404</td>
<td>Applied Structures</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 405</td>
<td>Building Information Modeling for Construction Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 422</td>
<td>Composite Materials for Sustainable Construction</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 453</td>
<td>Construction Planning and Scheduling</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 454</td>
<td>Construction Project Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 455</td>
<td>Construction Contracts and Specifications</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CME 497</td>
<td>Senior Seminar</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Upper Division Electives (9 credits)**

Total minimum credits for the degree 128 credits

**Concentration in Wood Products Engineering (14 credits)**

CME 322 Mechanical Processing  
CME 326 Fluid Treatments  
CME 376 Decay of Wood Products  
CME 388 Wood Identification  
CME 444 Materials Marketing

**Concentration in Sustainable Construction and Renewable Materials (12 credits from the following)** for students who entered the program prior to 2010-11

CIE 326 Engineering Materials  
CIE 478 Rehab of Civil Structures  
ERE 519 Green Entrepreneurship  
EST 426 Community Planning and Sustainability  
EST 550 Environmental Impact Analysis  
CME 330 Building Codes  
CME 376 Decay of Wood Products
TOP

Graduate Program in Sustainable Construction Management and Wood Science

Graduate areas of study related to sustainable construction management and wood science allow students with technical degrees to engage specific topics of current interest. There is an overall objective of having students look at the broad environmental implications of the construction process and the use of wood as a material, to be efficient and environmentally correct in their use of materials, and to integrate current technology to a practicum, thesis or dissertation, as appropriate to the graduate degree. The department offers three degrees: the Master of Professional Studies (M.P.S.), the Master of Science (M.S.), and the Doctor of Philosophy (Ph.D.).

General entry requirements to the Sustainable Construction Management and Wood Science program follow those described in the catalog for the Graduate School at SUNY-ESF. The Option in Sustainable Construction Management and Wood Science (SCMWS) offers three areas of study:

- Construction Management
- Sustainable Construction
- Wood Science

Entry requirements to the Option in Sustainable Construction Management and Wood Science are specific to each area of study. Students are accepted into our programs from a variety of backgrounds. When the Department of Sustainable Construction Management and Engineering (SCME) reviews an applicant’s academic and professional experience, it may determine that preparatory coursework is required before entry into the program. Either undergraduate or graduate courses may be recommended to remedy deficiencies depending on circumstances. In some cases, remedial coursework should be completed prior to matriculation.

**Entry requirements for Construction Management:** applicants for the Master of Science or Ph.D. degrees in the construction management area of study are required to have a bachelor’s degree in one of the following: science, construction management, business, management, architecture, or engineering.

Applicants for the M.P.S. degree in the construction management area of study are required to have a minimum of five years’ experience in the construction management industry plus a bachelor’s degree in one of the following: science, construction management, business, management, architecture, or engineering.

**Entry requirements for Sustainable Construction** Applicants for the Master of Science or Ph.D. degrees in sustainable construction are required to have a bachelor’s degree in one of the following: science, construction management, architecture, or engineering. Students must have completed courses in physics, chemistry, and calculus.
Applicants for the M.P.S. degree in sustainable construction are required to have a minimum of two years’ experience in the construction management industry plus a bachelor’s degree in one of the following: science, construction management, architecture, or engineering. Students must have completed courses in physics, chemistry, and calculus.

**Entry requirements for Wood Science:** Applicants for the Master of Science or Ph.D. degrees in the wood science area of study are required to have a bachelor’s degree in science or engineering. Applicants must have the appropriate undergraduate degree for the area of study they pursue. Applicants must have completed at least one semester of coursework in chemistry, biology, physics, and calculus.

Applicants for the M.P.S. degree in wood science are required to have a minimum of two years’ experience in the wood products engineering or related industry plus a bachelor’s degree in science or engineering. Applicants to the M.P.S. in wood science and technology must have completed at least one semester of coursework in chemistry, biology, physics, and calculus.

**Degree requirements**

The Ph.D. degree requires a minimum total of 60 graduate credits. These credits must include a minimum of 30 credits of coursework, and include not more than 30 credits for dissertation. As tool requirements, students must demonstrate competence in one of the three following areas: computer science, statistics or advanced mathematics, or a language other than English commonly used in science or engineering practice. A study plan that formally identifies an individual’s program requirements is developed for each student as soon as possible, but at least during the first year of graduate study. This plan includes all required and elective courses as well as a tentative schedule for completion.

The M.S. degree requires a minimum of 30 credit hours. A minimum of 18 credits of coursework and a minimum of 6 thesis credits are required to complete the M.S. degree. Undergraduate courses do not meet the requirements for minimum number of graduate credit hours. Students select a study area at the time of application for admission to the program. Specific areas of study may require specific coursework requirements. If so, they are listed under that area of study. The student’s study plan (Form 3B) must be approved by the steering committee and graduate coordinator or department chair by the end of the first semester in residence.

The purpose of the M.P.S. degree is to update current professional skills and/or to prepare graduate students for higher levels of management in their general area of expertise. The M.P.S. degree is intended to be a terminal degree, therefore acceptance to the M.P.S. degree does not guarantee admission to the M.S. or Ph.D. programs and vice versa. A minimum of 30 credit hours are required for the M.P.S. degree. The degree requires 24-27 credits of graduate-level course work, a 3-6 credit practicum or synthesis based on professional experience, and a capstone seminar. Specific coursework requirements are listed under each area of study.

**Construction Management (M.S., M.P.S., Ph.D.)**

Participating Faculty: CROVELLA; KYANKA; MORSI-HUSSEIN; SMITH, J.; TISS
Ph.D./M.S. in Construction Management. Topics for the M.S. or Ph.D. research may include the following:

- Construction project management
- Estimating, cost engineering, building codes and zoning
- Green construction
- Production management
- Computer graphics and computer applications in engineering
- Structural design

For the M.S. or Ph.D. degree in Construction Management the following courses are required (or their equivalent with committee approval):

CME 543 Construction Estimating (3)
CME 653 Construction Planning and Scheduling (3)
CME 654 Construction Project Management (3)

M.P.S. in Construction Management: Requirements include 24-27 credit hours of required and elective coursework in three categories plus 3-6 credit hours of a practicum or professional experience/synthesis. Two coursework options are available, the M.P.S. coursework and practicum option, or the M.P.S. coursework and synthesis option.

M.P.S. coursework and practicum option (total minimum of 30 credits): Engineering/construction management courses (12-21 credits), resource management courses (3-6 credits), environmental studies courses (3-6 credits), practicum (3-6 credits).

Engineering/construction management courses (12-21 credits). These courses (group A or group B) are required:
(Students who plan to complete their degree in one calendar year should select group B)

A:

CME 543 Construction Estimating (3)
CME 653 Construction Planning and Scheduling (3)
CME 654 Construction Project Management (3)

OR

B:

CME 643 Estimating for Construction in a Green Global Economy (3)
CME 663 Managing a Construction Project through Construction Planning and Scheduling (3)
CME 664 Urban Project Management (3)
Select additional courses from the following or similar courses with committee approval:

CME 525 Construction Methods and Equipment (3)
CME 531 Construction Safety (3)
CME 535 Cost Engineering (3)
CME 658 Construction Contracts and Specifications (3)

Resource management courses (3-6 credits) from the following or similar courses with committee approval:

FOR 665 Natural Resources Policy (3)
FOR 670 Resource and Environmental Economics (3)
FOR 680 Urban Forestry (3)
FOR 685 Business and Managerial Law (3)
FOR 687 Environmental Law and Policy (3)
FOR 689 Natural Resources Law and Policy (3)
FOR 770 Ecological Economics and Policy (3)

Environmental studies courses (3-6 credits) from the following or similar courses with committee approval:

EST 550 Environmental Impact Analysis (3)
EST 603 Research Methods and Design (3)
EST 604 Social Survey Research Methods for Environmental Issues (3)
EST 605 Qualitative Methods (3)
EST 626 Concepts and Principles of Sustainable Development (3)
EST 627 Environmental and Energy Auditing (3)
EST 635 Public Participation and Decision Making: Theory and Application (3)
EST 640 Environmental Thought and Ethics (3)
EST 660 Land Use Law (3)

Practicum (3-6 credits):

**CME 898 Professional Experience/Synthesis (3-6)**

**M.P.S. coursework and synthesis option**: Core courses (10 credits), engineering/construction management courses (9 credits), application electives (5-8 credits), professional experience/synthesis (3-6 credits). Total minimum of 30 credits.

Core courses (minimum 10 credits): These courses are required (group A or group B): Students who plan to complete the degree in one calendar year should select group B.

A:
CME 543 Construction Estimating (3)  
CME 653 Construction Planning and Scheduling (3)  
CME 654 Construction Project Management (3)  
CME 658 Construction Contracts and Specifications (3)  

OR

B:

CME 643 Estimating for Construction in a Green Global Economy (3)  
CME 663 Managing a Construction Project through Construction Planning and Scheduling (3)  
CME 664 Urban Project Management (3)  
CME 658 Construction Contracts and Specifications (3)  

Engineering/construction management courses (9 credits) from the following or similar with committee approval:

CME 525 Construction Methods and Equipment (3)  
CME 531 Construction Safety (3)  
CME 535 Cost Engineering (3)  
CME 605 Building Information Modeling/ Construction Management (3)  

Application electives (5-8 credits):

As approved by the steering committee

Professional experience/synthesis (3-6 credits):

CME 898 Professional Experience/Synthesis (3 - 6)

**Sustainable Construction (M.S., M.P.S., Ph.D.)**

Participating Faculty: CROVELLA; KYANKA; MORSI-HUSSEIN; MEYER; SMITH, J.; SMITH, W.; TISS. This area of study is for students interested in sustainable construction practices including topics such as energy use in buildings, material use in sustainable construction, life cycle analysis, environmental rating systems and environmental performance measures.

**Ph.D./M.S. in Sustainable Construction:** Topics for the M.S. or Ph.D. research may include the following:

- Energy systems in buildings
- Sustainable materials
- Environmental performance measures
- Building codes
- Renewable materials
- Deconstruction and reuse
- Life cycle analysis
- Structural design

Required coursework: For the M.S. degree in Sustainable Construction, students must complete coursework in construction project management if this was not part of their undergraduate degree. For the M.S. degree and Ph.D. degree, the student’s study plan is developed with the steering committee according to the general college guidelines described earlier.

**M.P.S. in Sustainable Construction**: 24-27 credit hours of coursework plus 3-6 credit hours of a practicum or professional experience/synthesis. Two coursework options are available, the M.P.S. coursework and practicum option, or the M.P.S. coursework and synthesis option. Total minimum of 30 credits

**M.P.S. coursework and practicum option**: Engineering/construction management courses (12-21 credits), resource management courses (3-6 credits), environmental studies courses (3-6 credits), practicum (3-6 credits). Total minimum of 30 credits.

Engineering/construction management courses (12-21 credits) from the following or similar courses with committee approval:

- CME 605 Building Information Modeling /Construction Management (3)
- CME 543 Construction Estimating (3)
- CME 653 Construction Planning and Scheduling (3)
- CME 654 Construction Project Management (3)
- CIE 678 Rehab of Civil Structures (3)

Resource management courses (3-6 credits) from the following or similar courses with committee approval:

- FOR 665 Natural Resources Policy (3)
- FOR 670 Resource and Environmental Economics (3)
- FOR 680 Urban Forestry (3)
- FOR 685 Business and Managerial Law (3)
- FOR 687 Environmental Law and Policy (3)
- FOR 689 Natural Resources Law and Policy (3)
- FOR 770 Ecological Economics and Policy (3)

Environmental studies courses (3-6 credits) from the following or similar courses with committee approval:
EST 550 Environmental Impact Analysis (3)
EST 603 Research Methods and Design (3)
EST 604 Social Survey Research Methods for Environmental Issues (3)
EST 605 Qualitative Methods (3)
EST 626 Concepts and Principles of Sustainable Development (3)
EST 627 Environmental and Energy Auditing (3)
EST 635 Public Participation and Decision Making: Theory and Application (3)
EST 640 Environmental Thought and Ethics (3)
EST 660 Land Use Law (3)

Practicum (3-6 credits):

CME 898 Professional Experience/Synthesis (3 - 6)

**M.P.S. coursework and synthesis option:** Core courses (10 credits), engineering/construction management courses (9 credits), application electives (5-8 credits), professional experience/synthesis (3-6 credits). Total minimum of 30 credits.

Core courses (10 credits) from the following or similar with committee approval:

- CME 532 Mechanical/Electrical Equipment (3)
- CME 565 Sustainable Innovations for Residential Construction (3)
- CME 596 Sustainable Energy Systems for Buildings (3)
- CME 596 Environmental Performance Measures for Buildings (3)
- ERE 519 Green Entrepreneurship (3)

Engineering/construction management courses (9 credits) from the following or similar with committee approval:

- CME 605 Building Information Modeling/Construction Management (3)
- CME 543 Construction Estimating (3)
- CME 653 Construction Planning and Scheduling (3)
- CME 654 Construction Project Management (3)
- CIE 678 Rehab of Civil Structures (3)

Application electives (5-8 credits):

As approved by the committee

Synthesis (3-6 credits):

CME 898 Professional Experience/Synthesis (3-6)

**Wood Science (M.S., M.P.S., Ph.D.)**
Participating Faculty: ANAGNOST; CROVELLA; KYANKA; MEYER; MORSI-HUSSEIN; SMITH, J.; SMITH, W. Students entering this area of study should have an undergraduate degree in wood science or a related area of science or engineering.

**M.P.S. in Wood Science and Technology:** 24-27 credit hours of coursework plus 3-6 credit hours of a practicum or professional experience/synthesis. Two coursework options are available, the MPS coursework and practicum option and the MPS coursework and synthesis option.

1. **M.P.S. coursework and practicum option:** Engineering/construction management courses (12-21 credits), resource management courses (3-6 credits), environmental studies courses (3-6 credits), practicum (3-6 credits). Total minimum of 30 credits. Courses are selected in consultation with the steering committee.

2. **M.P.S. coursework and synthesis option:** Core courses (10 credits), engineering/construction management courses (9 credits), application electives (5-8 credits), professional experience/synthesis (3-6 credits). Total minimum of 30 credits. Courses are selected in consultation with the steering committee.

**Ph.D./M.S. in Wood Science**

Topics for the M.S. or Ph.D. research may include the following:

- Wood Science and Technology (adhesives and finishing, processing and machining, mechanical and physical properties, wood anatomy and wood properties, wood biodegradation, wood composites). Because wood is renewable, it will meet the needs of modern society for a perpetually available, carbon dioxide-neutral material perfectly suited for a vast array of products. The study area Wood Science and Technology includes detailed research on physical, mechanical, or anatomical aspects of wood and its utilization and leads to the M.S., M.P.S., or Ph.D. degree. Wood science stresses research on the material science of wood, dealing with properties important to its use, or to solve problems in wood utilization by practical applications of such knowledge.

- Engineered Wood Products and Structures (M.S., Ph.D.) (materials science, engineering mechanics and elasticity, engineering properties of wood composites, computer-aided design, static and dynamic properties of wood) Students with interest in Engineered Wood Products and Structures should have a strong background in integral calculus, statics, mechanics, and mechanical and physical properties of wood. The behavior of wood and wood-based components under loads and the effects of duration of the loads are critical elements when developing engineering codes. Wooden components as small as dowels or as large as bridge beams are considered, using elements of materials science, engineering mechanics and structural engineering. Basic property knowledge, employing theories of elasticity, visco-elasticity and fracture mechanics, is coupled with computer-aided design data to analyze the performance of wood and to solve
application problems, such as those encountered in wood-frame construction and timber utility structures. How such factors as chemical fire retardant treatments, adhesive performance and mechanical fastener design interact with use requirements is considered. National and international design codes and their development play an important role in specifying research areas of current interest and need. Fabrication and testing of actual components such as trusses, composite beams, and furniture connections are completed in the department’s Wood Engineering Laboratory.

- **Wood Anatomy and Ultrastructure** (wood formation and cell wall organization, cytoskeleton of plant cells, properties related to anatomy and ultrastructure, electron, light and video microscopy). Students with interest in Wood Anatomy and Ultrastructure should have an undergraduate degree in wood anatomy or the biological sciences. Students are required to develop an extensive background in all aspects of microscopy: light, scanning electron, transmission electron, video microscopy and image analysis, including micro-techniques for effective preparation of specimens for the appropriate instrument. Wood anatomy studies are basic to wood identification, wood utilization, and physical/mechanical properties. These studies may include woods from other continents. The field of ultrastructure is very broad with applications in many biological, chemical and materials sciences. Applied to wood, it emphasizes the sub-light microscopic structures (smaller than 0.2 micrometers) found in this natural material, either in the mature form or in its formative stages where various organelles of the living cell may be studied for their roles in producing the mature wood cell. The behavior of wood in its many applications can be observed and explained via microscopy and related instrumentation such as EDXA (energy-dispersive x-ray analysis). State-of-the-art resources and facilities are concentrated in the Center for Ultrastructure Studies, which provides instruction and research support staff.

- **Wood Treatments** (wood-water relationships and wood drying, preservative treatments, polymer treatments, sealants and coatings). Students with an interest in wood treatments and preservation should have an undergraduate degree in wood science or a closely related field. Graduate study in the area of wood treatments allows the student to investigate the scientific basis for the improvement of wood and wood products with various treatments, which include drying, preservative treatments and coatings. Preparation for research includes graduate coursework in wood-water relationships and transport processes and additional study in areas such as wood anatomy and ultrastructure, mechanical properties, wood chemistry, wood microbiology, thermodynamics, and engineering economics. Current research interests include use of innovative techniques to dry and preserve wood, effects of drying method on the subsequent treatability of wood, evaluation of energy usage in lumber drying technologies, improving wood properties with polymer treatments, and moisture migration studies.
Tropical Timbers (identification keys and systematics, wood properties and end use suitability, life zone analyses, expert systems). Studies of tropical timbers take many forms, depending on individual student interests. Often students from other countries bring specific problems and materials with them so their thesis will find immediate application when they return home. The holdings of the C. deZeeuw Memorial Library and reference wood specimens of the H.P. Brown Memorial Wood Collection of the Tropical Timber Information Center (TTIC), housed in Baker Laboratory facilities, are vital to this work. Research topics may be formulated to answer questions dealing with anatomy, identification, properties or uses of various woods from around the world, using the TTIC reference materials. These studies may be quite narrow, such as anatomy and physical properties of woods from a particular region, or much broader, such as regional distribution of species and species groups based on life zone research throughout a country or larger geographic area.

Facilities

A major renovation to the teaching and research laboratories in Baker Laboratory has been completed with a computer facility for estimating, scheduling, project management, wood engineering design, computer-aided design and drafting, finite element analysis and other specialized software. The Wood Products Engineering Laboratory TL-317 (WPEL), is an IAS accredited laboratory (ANS/ISO/IEC 17025:2005) for mechanical testing and includes a wide range of equipment for mechanical testing and wood processing, including electronic data acquisition capabilities, a dry kiln, wood preservation equipment, a wood machining lab, and sawmill.

Construction Management facilities for research and teaching include laboratories for construction safety, building materials and green construction. A dedicated computer laboratory, the Construction Management Laboratory, provides specialized software for construction estimating, scheduling, project management, wood engineering design, computer-aided design and drafting, finite element analysis and other specialized software.

The C.J.K. Wang Wood Biodegradation Laboratory includes mycology culturing facilities and a modern molecular analysis laboratory; research microscopes, image analysis system and wood micro-technique equipment.

One of the largest wood collections in the world, the H. P. Brown Memorial Wood Collection is used to support the graduate research program of the Tropical Timber Information Center. The center also maintains the Carl deZeeuw Memorial Library.

A complete microscopy and image analysis laboratory is provided by the N.C. Brown Center for Ultrastructure Studies. This equipment includes a JEOL JSM-2000EX transmission electron microscope, JEOL JSM-5800LV scanning electron microscope with energy dispersive x-ray analysis and particulate analysis accessories, and a wide variety of light microscopes equipped with image enhancement and various video image analysis capabilities. Graduate students in wood science using this equipment have the best available systems to relate the macroscopic behavior of wood to its
anatomical characteristics. The facility is available for students and faculty at all departments at SUNY-ESF and neighboring colleges and universities.

The Renewable Materials Institute conducts research in the broad area of sustainable development of wood resources and the uses of wood products.
Course Requirements

The Certificate of Graduate Study in Environmental Decision Making requires the completion of 12 credit hours of coursework. The foundational Course for the Certificate is EST 635: Public Participation and Environmental Decision Making, which all students working towards the Certificate must take. In addition to this course, students must take 9 credits of coursework from those courses listed below. At least one course from each of the two categories: A. Environmental Policy and Law; and B. Human and Environment Interactions, must be included. To be counted as part of progress toward the Certificate, a grade of B or better must be earned in each course. Up to 6 credits from Syracuse University may be used to meet these requirements.

- Required Course: EST 635 Public Participation and Environmental Decision Making
- Choose 9 Credits from the following two lists, at least one course from each category

A: Environmental Policy and Law

- EST 612 Environmental Policy and Governance
- EST 609 Collaborative Governance Processes
- EST 796 Environment and Natural Resources Policy Analysis
- EST 660 Land Use Law
- FOR 689 Natural Resources Law and Policy
- FOR 687 Environmental Law and Policy
- LAW 716 Environmental Law
- LAW 865 Natural Resources Law
- PPA 775 Energy, Environment and Resources Policy
- PPA 777 Economics of Environmental Policy

B. Human and Environment Interactions.

- EST 606 Environmental Risk Perception
- EST 608 Environmental Advocacy Campaigns & Conflict Resolution
- EST 625 Wetland Management Policy
- EST 626 Concepts and Principles of Sustainable Development
- EST 628 Great Lakes Policy and Management
- EST 645 Mass Media and Environmental Affairs
- EST 650 Environmental Perception and Human Behavior
- PPA 730 Problems in Public Administration (related to environmental decision-making; e.g. Environmental Conflict Resolution and Collaboration)
The Department of Environmental Resources Engineering (ERE) offers M.P.S., M.S., and Ph.D. programs in Environmental Resources Engineering. This curriculum proposal adds six new options to our graduate programs, removes one M.P.S. option, and clarifies the language in the Catalog related to the graduate programs in ERE.

- We request to offer an M.P.S. degree to our graduate options. At present, ERE offers M.S. and Ph.D. degrees in Environmental Resources Engineering within the options of Ecological Engineering, Geospatial Information Science and Engineering, and Water Resources Engineering. To make better use of our faculty expertise and increase ERE’s graduate enrollment, we are proposing to offer M.P.S. degrees in the options of 1) Ecological Engineering; 2) Geospatial Information Science and Engineering; and 3) Water Resources Engineering. In addition, we are proposing to remove the Mapping Science option, which only offered a M.P.S. only degree. We expect students interested in that option will now enroll in the new M.P.S. degree in the Geographic Information Science and Engineering option.

- We also propose a new option—Environmental Resources Engineering—offering M.P.S., M.S., and Ph.D. degrees to support the growing interest of prospective graduate applicants in the general area of environmental resources engineering. When our Department was named Forest Engineering, we had a Forest Engineering Option. This general ERE option emphasizes the resource focus of environmental engineering. It is aimed at potential graduate students who have a multidisciplinary educational background or interdisciplinary work experience, or seek an interdisciplinary approach to environmental resource engineering issues.
**Institutional Impact:**

<table>
<thead>
<tr>
<th>Anticipated Enrollment: 6-9 per semester</th>
<th>Change from existing condition: Add six new options to ERE’s graduate programs, and remove one option.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Faculty or Staffing Requirements:</td>
<td>0</td>
</tr>
<tr>
<td>New Technology and Classroom Resource Demands:</td>
<td>0</td>
</tr>
<tr>
<td>New Computing Resources Requirements:</td>
<td>0</td>
</tr>
<tr>
<td>New Accreditation Requirements:</td>
<td>0</td>
</tr>
<tr>
<td>New Assessment Requirements (explain &amp; describe):</td>
<td>0</td>
</tr>
<tr>
<td>New Library Resources Requirements:</td>
<td>0</td>
</tr>
<tr>
<td>New Transportation Requirements:</td>
<td>0</td>
</tr>
<tr>
<td>New Forest Properties or Field Practicum Facilities Required:</td>
<td>0</td>
</tr>
</tbody>
</table>

**Impacts on other Departments at ESF (please obtain and attach response from affected departments):**

The six new options have similar mastery course requirements to ERE’s existing graduate programs of study. A minimum of 15 credit hours of engineering and applied science courses is required in each option, plus additional courses determined by the student's steering committee. The ERE Department maintains a list of graduate courses for each competence area, which are mostly offered by the ERE Department or distributed over several other departments. No considerable impacts on any individual department at ESF are anticipated.

**Impacts on Admissions (particularly transfer requirements and articulation agreements; please obtain and attach response from Admissions if an impact is anticipated):**

We anticipate recruiting 2-3 graduate students per year in each new option. Prior applicants to the M.P.S. option of Mapping Sciences will move to the new M.P.S. option of Geographic Information Science and Engineering.
List courses taught outside the Department at ESF:  None required

List courses taught outside the Department at SU:
- Accessory Instruction credit hours at SU required per student in this curriculum: 0
- Accessory Instruction credit hours required per semester by this curriculum
- Change in Accessory Instruction needs over current programs and curricula
Graduate Programs

Graduate studies and research are primarily concerned with environmental and resource-related problems. Students with a bachelor of science degree in engineering or in environmental sciences, physics, or mathematics have the opportunity to design an individual program of graduate study. Applicants to all programs of study are required to have a bachelor's degree in science or engineering and are expected to have completed at least one 3-credit course in physics, one 3-credit course in statistics, and two 3-credit courses in calculus. Students admitted without necessary background are required to take additional prerequisite courses required by the Department and the following areas of study.

The M.P.S. degree requires the successful completion of a minimum of 30 credits at the graduate level, of which at least 24 must be in coursework. A comprehensive project or practicum completes the M.P.S. degree requirements. The M.S. degree requires the successful completion of a minimum of 30 credits at the graduate level, of which at least 18 must be in coursework and a minimum of six credits for the thesis. The Ph.D. degree requires the successful completion of a minimum of 60 credits at the graduate level, of which 30-48 are for coursework and 12-30 credits are for dissertation. All graduate degrees in ERE require completion of at least 15 credit hours of graduate coursework in engineering and applied science courses. A departmental seminar is also required.

Facilities

The teaching and research facilities in Baker Laboratory were renovated in 2008 and support graduate study and research with modern laboratories and instrumentation. We have dedicated laboratories for ecological engineering, geospatial engineering, and water resources engineering research and instruction, supported by campus staff; in the wood and machine shops, and as well as Analytical and Technical Services. Research and analysis is facilitated by a powerful range of computing platforms and software. Off-campus facilities include the extensive ESF properties, and numerous field sites supported by an array of field equipment for environmental resource engineering measurements.

The Department of ERE program in Environmental and Resources Engineering offers graduate options in:

**Ecological Engineering (M.P.S., M.S., Ph.D.)**

Participating Faculty: DALEY, DIEMONT, ENDRENY, KROLL, SHAW, TAO

Ecological Engineering is the design of ecosystems for the mutual benefit of humans and the environment. Ideal design considers humans to be part of nature rather than apart from nature. At SUNY–ESF we believe that ecological engineering education and research should meet local to global needs. We teach and research sustainable solutions and approach ecological engineering broadly, working in many areas of the world and in most major areas of ecological engineering. Graduates from the ecological engineering option commonly find employment or continue their advanced graduate education in any of the following areas of practice:

- Ecosystem restoration, including watershed, river, forest and wetland restoration
- Design of sustainable systems for wastewater treatment and stormwater management
- Environmental remediation
- Urban ecosystem design and development
- Industrial ecology, life cycle analysis and sustainability analysis

Ecological Engineering emphasizes engineering design of ecosystems consistent with ecological principles of natural, self-organizing, self-maintaining systems. This interdisciplinary field incorporates knowledge in engineering, ecology and social sciences to produce energy- and information-efficient solutions to environmental problems. Public policy, ethics and values are considered in the decision-making process. Students select between alternative solutions to ecological resource problems, in recognition of environmental, economic, legal, social and managerial constraints.

Program prerequisite or co-requisite courses beyond the departmental requirement include at least one semester of study in thermodynamics, fluid mechanics, or statics; probability and statistics; ecology; and hydrology. Applicants are required to have a bachelor's degree in science or engineering with one year of study in calculus and at least one semester of study in computing methods, chemistry, and biology.
Program mastery courses beyond the departmental requirement include at least one course (3+ credit hours per course) in each of the 4 areas of competence listed below (illustrative courses are listed in parenthesis).

- **Ecosystem Restoration** (e.g., Ecosystem Restoration Design, Sustainability Analysis, Sustainable Engineering, River Form and Process, Ecological Engineering in the Tropics)
- **Pollutant Treatment** (e.g., Methods in Ecological Treatment, Ecological Engineering for Waste Management, Water Quality Improvement, Stormwater Management)
- **Modeling** (e.g., Hydrologic Modeling, Systems Engineering, Engineering Hydrology & Hydraulics)
- **Ecosystem Sciences** (e.g., Microbial Ecology, Ecosystems, Systems Ecology, Tropical Ecology, Ecological Biogeochemistry, Plant Ecology and Global Change, Aquatic Ecosystem Restoration, Limnology, Environmental Chemistry)

At least 15 credit hours of graduate coursework must be completed in engineering and applied science courses. Research credits complete the degree requirements.

**Environmental Management (M.P.S.)**

Participating Faculty: DALEY, ENDRANY, IM, KROLL, QUACKENBUSH, SHAW

Environmental Management combines environmental engineering with environmental and business management to provide breadth and perspective for the student aspiring to managerial responsibility in public or private employment. Student coursework is designed to enhance technical and problem-solving skills to meet contemporary needs of environmental managers. Illustrative areas in this option include, but not limited to:

- Engineering management
- Sustainable development
- Brownfield development
- Hazardous and solid waste management
- Solid waste management
- Energy resources management
- Water resource management

Environmental Management combines environmental engineering with environmental and business management and environmental law or policy to provide breadth and perspective for the student aspiring to managerial responsibility in public or private employment. Student coursework is designed to enhance technical and problem-solving skills to meet contemporary needs of environmental managers.

Program prerequisite or co-requisite courses beyond the departmental requirement include at least sixthree 3-credit undergraduate courses from at least three of the following fields: chemistry, physics, geographic measurements, calculus, statistics, engineering mechanics, ecology, computer science, and economics.

Program mastery courses beyond the departmental requirement include at least 15 credit hours of graduate coursework completed in engineering and applied science courses, 3–6 credit hours in natural sciences; and 3–6 hours in resource management. A minimum of three credit hours of coursework in each of the following areas:

- Project Management (e.g., cost engineering, principles of management, engineering economics, resource economics, engineering management, systems engineering)
- Environmental Policy (e.g., environmental law, environmental impact analysis)
- Environmental Resources Management (e.g., solid or hazardous waste management, watershed management, sustainable design, sustainable development)

A comprehensive project or practicum completes the M.P.S. degree requirements. Study programs are flexible and are tailored to the interests and strengths of individuals.
Environmental Resources Engineering (M.P.S., M.S., Ph.D.)
Participating Faculty: DALEY, DIEMONT, ENDRENY, IM, KROLL, MOUNTRAKIS, QUACKENBUSH, SHAW, TAO

Environmental Resources Engineering takes an interdisciplinary approach to solve environmental and resource-related problems. Emphasis is placed on applying science and engineering to the conservation, restoration, holistic development, and improved utilization of the natural environment and its related resources. Student's program of study may be tailored to systems and processes at different geospatial scales, from biomolecules to watersheds, and employing various tools and techniques such as biomolecular techniques, remote sensing, hydrodynamic modeling, and systems analysis. Illustrative areas in this option include, but not limited to:

- Alternative energy systems
- Environmental remediation
- Resource recovery from wastes
- Sustainable technologies
- Climate change mitigation and adaptation

Environmental Resources Engineering takes an interdisciplinary approach to solve environmental and resource-related problems. Emphasis is placed on applying science and engineering to the conservation, restoration, holistic development, and improved utilization of the natural environment and its related resources. Student's program of study may be tailored to systems and processes at different geospatial scales, from biomolecules to watersheds, and employing various tools and techniques such as biomolecular techniques, remote sensing, hydrodynamic modeling, and systems analysis.

Program prerequisite or co-requisite courses beyond the departmental requirement include at least one semester of study in thermodynamics, fluid mechanics, or statics; hydrology, chemistry, or biology; and computing methods.

Program mastery courses beyond the departmental requirement are arranged to meet the objectives of the individual student program. A student's program of study in this option may combine some competence areas in the other ERE options, or introduce new competence areas.

Geospatial Information Science and Engineering (M.P.S., M.S., Ph.D.)
Participating Faculty: IM, MOUNTRAKIS, QUACKENBUSH

Geospatial Information Science and Engineering is designed for specialized study in spatial information acquisition, analysis, modeling and applications. This includes theoretical and applied projects in sensing systems and the location, measurement, analysis and description of ground features and earth resources. It also includes use of geographic information systems (GIS) to incorporate spatial data into a wide range of environmental and engineering problems. Illustrative areas in this option include, but not limited to:

- Remote sensing and digital image/video analysis
- Geographic information systems (GIS)
- Spatial and spatiotemporal databases
- Artificial intelligence/machine learning in spatial analysis and modeling
- Environmental resources monitoring, modeling and assessment

Geospatial Information Science and Engineering is designed for specialized research study in spatial information acquisition, analysis, modeling and applications. This includes theoretical and applied study projects in sensing systems and the location, measurement, analysis and description of ground features and earth resources. It also includes use of geographic information systems (GIS) to incorporate spatial data into a wide range of environmental and engineering problems.

Program prerequisite or co-requisite courses beyond the departmental requirement include at least one year of physics and calculus, one course in statistics, and one engineering science course in surveying, numerical methods, or computer science.
Program mastery courses beyond the departmental requirement include at least one course (3+ credit hours) in each of the four Geospatial Information Science and Engineering areas (illustrative courses are listed in parenthesis):

- Remote sensing (e.g., Principles of Remote Sensing, Remote Sensing of the Environment)
- Geographic information systems (e.g., Introduction to Spatial Information, GIS for Engineers, GIS-Based Modeling, Introduction to Global Positioning Systems, Spatial Analysis, Digital Image Analysis, Numerical and Computing Methods, Systems Engineering, Design and Analysis of Algorithm, Introduction to Artificial Neural Networks, Introduction to Database Management Systems, Data Mining, Artificial Intelligence)
- Spatial analysis and programming (e.g., Spatial Analysis, Digital Image Analysis, Numerical and Computing Methods, Systems Engineering, Design and Analysis of Algorithm, Introduction to Artificial Neural Networks, Introduction to Database Management Systems, Data Mining, Artificial Intelligence)
- Statistics (e.g., Statistical Analysis, Multivariate Statistical Methods, Nonparametric Statistics, Analysis of Variance, Regression Analysis, Map Accuracy Assessment, Sampling Methods)

Ph.D. students will take an additional course in at least two of these areas (6+ credit hours total). These areas of competence form the basis for your graduate coursework and are supplemented by studies in systems analysis, environmental sciences and management, and geography. Study programs are flexible and are tailored to the interests and strengths of individuals. Departmental and other seminars are also required. Of the total graduate coursework, at least 15 credit hours must be completed in engineering and applied science courses. Research credits complete the degree requirements.

Mapping Sciences (M.P.S.)  
Participating Faculty: IM, MOUNTRAKIS, QUACKENBUSH

- Geographic information systems (GIS)
- Global positioning systems (GPS)
- Analytical and digital photogrammetry
- Remote sensing and image processing

Mapping Sciences covers the development and practice of mapping technologies for environmental and engineering applications. Technologies used include GIS and GPS, as well as remote sensing and image processing tools.

Program prerequisite or co-requisite courses include at least one year of both physics and calculus, one course in statistics, and one course in either surveying or computer science. Students admitted without necessary background would be required to take additional prerequisite courses.

Program mastery courses are taken so students upon completion demonstrate competency in spatial data acquisition and fundamental spatial analysis concepts. This is typically achieved through completion of fundamental courses in remote sensing, geographic information systems, spatial analysis, and statistics. Students may specialize by taking advanced courses in the mapping sciences, statistics, computing, environmental sciences and management, or other fields.

A comprehensive project or practicum completes the M.P.S. degree requirements. Study programs are flexible and are tailored to the interests and strengths of individuals.

Water Resources Engineering (M.P.S., M.S., Ph.D.)  
Participating Faculty: DALEY, ENDRENY, KROLL, SHAW, TAO

Water Resources Engineering deals with analysis and design of water resource systems through field, laboratory, and computer methods. Emphasis is placed on coordinating engineering to reduce impacts on human and natural systems. Students select among alternative solutions to water resource problems, in recognition of environmental, economic, legal, social and managerial constraints. Laboratory equipment includes soil columns, a river table and two tilting and sediment circulating flumes, all supported by monitoring sensors. Analytical techniques using statistics, numerical analyses, and computer applications are emphasized. Modeling efforts include computational fluid dynamics, GIS, and remote sensing applications, distributed and real-time models, and model calibration and validation. Illustrative areas in this option include, but not limited to:
Watershed hydrology monitoring, modeling, management
Hydrologic and hydraulic experimentation and analysis
Water resource systems engineering
Stochastic and deterministic modeling
Pollutant fate and transport
River and watershed restoration

Water Resources Engineering deals with analysis and design of water resource systems through field, laboratory, and computer methods. Emphasis is placed on coordinating engineering to reduce impacts on human and natural systems. Students select among alternative solutions to water resource problems, in recognition of environmental, economic, legal, social and managerial constraints. Laboratory equipment includes soil columns, a river table and two tilting and sediment circulating flumes, all supported by monitoring sensors. Analytical techniques using statistics, numerical analyses, and computer applications are emphasized. Modeling efforts include computational fluid dynamics, GIS, and remote sensing applications, distributed and real-time models, and model calibration and validation.

Program prerequisite or co-requisite courses beyond the departmental requirement include probability and statistics, fluid mechanics, computing methods, and engineering hydrology. Applicants are required to have a bachelor’s degree in science or engineering with one year of study in calculus and one semester of study in computing methods.

Program mastery courses beyond the departmental requirement include at least one course (3+ credit hours) in each of the four areas of competence listed below (illustrative courses are listed in parenthesis). These areas of competence form the basis for your graduate coursework. Departmental and other seminars are also required.

- Environmental Hydraulics (e.g., Engineering Hydrology and Hydraulics, Open Channel Hydraulics, Transport Processes, Environmental Sediment Transport)
- Water Resources Modeling (e.g., Hydrologic Modeling, Systems Engineering, Groundwater Modeling)
- Hydrologic Zones and Fluxes (e.g., River Form and Process, HydroMeteorology, Vadose Zone Physics, Limnology, Hydrogeology)
- Water Quality (e.g., Water Pollution Engineering, Ecological Biogeochemistry, Environmental Chemistry; Environmental Aqueous Geochemistry)

At least 15 credit hours of graduate coursework must be completed in engineering and applied science courses. Research credits complete the degree requirements.
We propose name change from “Free Elective” to “Elective” in Senior Year of the ERE undergraduate curriculum. This “Elective” course is designed to provide students with more flexibility to broaden or deepen their knowledge that they have learned in the program. Students can take any courses for the 3crs “Elective” in Senior Year except for Physical Education courses. AP credits cannot be transferred to “Elective” as AP courses don’t meet the purpose of the “Elective” course.

We propose to increase the credit hours of ERE489 Environmental Resources Engineering Planning and Design from 3 to 4 because both the instructor and students commit time significantly greater than any other 3 credit hour course to this capstone course. SU also offers CIE475 (the capstone course) for 4 credits. A separate course proposal for ERE489 Environmental Resources Engineering Planning and Design regarding this change has been submitted.

We propose change in total credit hours in the curriculum from 125 to 127 because the credit hours of ERE351 Basic Engineering Thermodynamics have changed from 2 to 3 and the change in the credit hours of ERE489 Environmental Resources Engineering Planning and Design has been requested. The change in the credit hours of ERE351 was previously approved by C.O.C. in 2011, but was not reflected in the AY2011-2012 catalog.

We propose to replace ERE 496 Fluid Mechanics with ERE 339 Fluid Mechanics (new course). A separate course proposal for ERE339 Fluid Mechanics has been submitted. This course was initially taught at ESF in the Fall of 2011. Students previously took a fluid mechanics course at Syracuse University (MAE 341 Fluid Mechanics for Engineers), a class more oriented to mechanical and aerospace engineers. A fluid mechanics course is taught in Paper Science & Engineering (Fluid Mechanics PSE 371), but that course is more oriented to chemical engineering than civil and environmental engineering.

We propose to combine “Directed Engineering Elective” and “Engineering Design Elective,” and change to “Engineering Elective” to broaden available courses to include engineering science, analysis and design. An “Engineering Elective” is an upper-division engineering course that is
advisor-approved and provides depth in engineering analysis, design or synthesis. Pre-approved SUNY ESF engineering elective courses are provided in the attached catalog.

6. We propose two new engineering elective courses—ERE 405/605 Sustainable Engineering and ERE 425/625 Ecosystem Restoration Design. Separate course proposals have been submitted.

7. We propose to change the course title of the following courses:

<table>
<thead>
<tr>
<th>Original curriculum</th>
<th>Revised curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERE275 Ecological Engineering I</td>
<td>ERE275 Ecological Engineering</td>
</tr>
<tr>
<td>ERE475 Ecological Engineering II</td>
<td>ERE475 Ecological Engineering for Water Quality Improvement</td>
</tr>
<tr>
<td>ERE675 Ecological Engineering for Waste Management</td>
<td>ERE675 Ecological Engineering for Water Quality Improvement</td>
</tr>
</tbody>
</table>

8. We propose to set C- as a requirement for students to pass each of the Calculus courses (i.e., Calculus 1-3) to move into a next level course. This requirement is necessary to ensure engineering students to have at least minimum quantitative skills to succeed in the ERE program. The admission office uses C as a grade threshold for the Calculus courses when assessing students who want to transfer into the ERE program.

Institutional Impact:

Anticipated Enrollment: per semester Change from existing condition:

New Faculty or Staffing Requirements: NA
New Technology and Classroom Resource Demands: NA
New Computing Resources Requirements: NA
New Accreditation Requirements: NA
New Assessment Requirements (explain & describe): NA
New Library Resources Requirements: NA
New Transportation Requirements: NA
New Forest Properties or Field Practicum Facilities Required: NA
Impacts on other Departments at ESF (please obtain and attach response from affected departments): NA
Impacts on Admissions (particularly transfer requirements and articulation agreements; please obtain and attach response from Admissions if an impact is anticipated) NA
List courses taught outside the Department at ESF: NA

List courses taught outside the Department at SU:
- Accessory Instruction credit hours at SU required per student in this curriculum: NA
- Accessory Instruction credit hours required per semester by this curriculum: NA
- Change in Accessory Instruction needs over current programs and curricula: NA

Accessory Instruction will be reduced as ERE students take ERE339 Fluid Mechanics at ESF with these curriculum changes. Students previously took MAE 341 Fluid Mechanics for Engineers at SU.

**Catalog Curriculum Narrative:**

Please see the attached catalog curriculum narrative.

**Curriculum Transition Plan:**

This revised curriculum will be implemented for incoming freshmen students starting from the fall 2012. We will publish this curriculum change in the AY2012-2013 Catalog (see attached).
Participating Faculty


The Environmental Resources Engineering department engages in teaching, research, and service to advance engineering practices to meet the needs of the world. With an innovative undergraduate curriculum and a wide variety of graduate courses, we provide outstanding opportunities for students to create and explore a host of educational opportunities. The department presently offers two undergraduate degree programs. Our newest program offering is the B.S. in Environmental Resources Engineering which is based on a long history of forest engineering that originated at SUNY ESF in 1971. The department offers an accredited undergraduate program in forest engineering that originated at ESF in 1971. Our ABET-accredited B.S. in Forest Engineering program will continue to be offered during a transition period through September 2013. The Environmental Resources Engineering faculty have particular strengths in water resource engineering, ecological engineering, and geospatial engineering, and these strengths are reflected in the undergraduate curriculum, though our flexible undergraduate curriculum allows students to also focus on traditional civil engineering practices. Required coursework in the humanities and social sciences ensures a well-balanced educational experience for graduates entering professional practice in engineering or those moving directly on to graduate school. With more than 1,200 graduates now in engineering practice, this unique program offers a breadth of engineering science and design coursework unparalleled in the United States.

The Department of Environmental Resources Engineering participates in graduate education leading to the master of professional studies, master of science, and doctor of philosophy degrees in environmental resource engineering.

**Bachelor of Science in Environmental Resources Engineering**

The primary objective of this degree program is to prepare qualified engineering graduates to operate with professional competence. A broad base of study in the fundamentals of engineering enables graduates to enter professional practices which focus on civil works as well as the use and protection of soil, water, air, and other renewable and non-renewable resources. The program is meant to educate professionals who will ensure sustainable development through engineering solutions that are environmentally responsible.

The objectives of the program are to prepare baccalaureate students who can successfully:

- Engage in professional engineering practice specializing in natural and designed environments
• Pursue graduate studies in environmental resources engineering, including ecological, geospatial and water resources engineering, and

• Expand and adapt their knowledge and skills to address the technological, environmental and social challenges of a changing world

A broad base of study in the fundamentals of engineering enables graduates to enter professional practices that focus on civil works as well as use and protection of soil, water, air and other renewable and non-renewable resources to ensure sustainable development.

Emphasis in this program is placed on applications in resource inventory, prediction, and evaluation; site analysis and development; environmental monitoring and impact assessment; environmental systems design, evaluation and management; pollution abatement and residuals management; and environmental site remediation.

The special importance of continual measurement and evaluation of the broad scale parameters that affect the resource base provides unique opportunities for study to students aiming toward professional careers involving the conceptualization, design and maintenance of geographically referenced environmental resource information systems.

This program is similar to many Civil and Environmental Engineering programs, with 2 years of core science and engineering courses followed by upper level requirements in Water and Wastewater Treatment, Geotechnical Engineering, Hydrology and Hydraulics, and Solid Waste Management. We offer advanced courses in Water Resources Engineering, a focus common to many Civil and Environmental Engineering programs. We differentiate our program from many Civil and Environmental Engineering programs by also offering introductory and advanced courses in the Ecological Engineering and Geospatial Engineering areas, two themes which complement our Water Resources Engineering area. The curriculum is developed to include hands-on, design-oriented courses starting in the freshman year, and allows students to explore advanced topics of interest through senior engineering electives. While most of our students use these engineering electives to focus on the Ecological Engineering, Geospatial Engineering, and Water Resources Engineering strengths of the Department of ERE, some students choose a to take upper level courses in Structural and Geotechnical Engineering. Graduates of the program enjoy many benefits derived from their capstone-curriculum course in engineering planning and design. This project-oriented course serves to help the student integrate four years of education to solve complex design problems commonly encountered in professional practice.

Students with an interest in graduate study can plan their undergraduate studies along an individualized track to prepare themselves for ESE’s master of science program in environmental and resource engineering. Students who qualify will be admitted to a quality graduate program with minimal interruption in their studies. In addition, qualified graduates in search of additional education find ready acceptance to top engineering graduate schools throughout the country.

The forest engineering program is accredited by the Engineering Accreditation Commission/Board for Engineering and Technology (EAC/ABET).

Students having advanced placement credits are encouraged to work closely with their adviser in order to best prepare for various upper-division elective sequences in technology, science, design and/or management.

The undergraduate curriculum in forest engineering consists of two broad categories of courses. The general education component provides students with knowledge and skills that are useful and important for all educated persons. The second category, professional courses, provides students with direct preparation for a career in engineering and applied sciences.
Students may be admitted directly as first-year freshman students at ESF or through a variety of transfer options. To enter the curriculum at the sophomore or junior level, a transferring student must have acceptable college credit in the designated coursework areas or suitable coursework substitutions. Regardless of which way students enter ESF, they must complete both the general and professional education requirements. Students having advanced placement credits are encouraged to work closely with their adviser in order to best prepare for various upper-division elective sequences in technology, science, design and/or management.

Engineering students with an interest in graduate study can plan their undergraduate studies along an individualized track which will prepare them for entry into graduate study either at SUNY ESF or at other top universities throughout the country. Our past graduates have successfully pursued MS and/or PhD degrees at MIT, Princeton, Brown, Cornell, Illinois, and Berkeley, among other schools, and our unique undergraduate curriculum provided them with skills to succeed in these programs. As the graduate program in Environmental Resources Engineering has grown, many students have chosen to stay at SUNY ESF, where our unique graduate programs offer unparalleled opportunities for graduate study.

Note: The requirements listed below also apply to currently matriculated students in the Forest Engineering program.

**Undergraduate Program Requirements**

**Lower Division Required Courses (58 credits)**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM 205 Calculus I</td>
<td>G, M 4</td>
</tr>
<tr>
<td>APM 206 Calculus II</td>
<td>M 4</td>
</tr>
<tr>
<td>APM 485 Differential Equations for Engineers and Scientists</td>
<td>M 3</td>
</tr>
<tr>
<td>EWP 190 Writing and the Environment</td>
<td>G, NS 3</td>
</tr>
<tr>
<td>EWP 290 Writing, Humanities and the Environment</td>
<td>G 3</td>
</tr>
<tr>
<td>EFB 101/102 General Biology I &amp; Laboratory</td>
<td>G, NS 4</td>
</tr>
<tr>
<td>EREGNE 22172 Statics and Dynamics</td>
<td>PE, E 4</td>
</tr>
<tr>
<td>EREGNE 36273 Mechanics of Materials</td>
<td>PE, E 3</td>
</tr>
<tr>
<td>FCH 150/151 General Chemistry I and Laboratory</td>
<td>NS 4</td>
</tr>
<tr>
<td>FCH 152/153 General Chemistry II and Laboratory</td>
<td>NS 4</td>
</tr>
<tr>
<td>ERE 132 Orientation Seminar: Environmental Resources Engineering</td>
<td>PE 1</td>
</tr>
<tr>
<td>ERE 133 Introduction to Engineering Design</td>
<td>PE, E 3</td>
</tr>
<tr>
<td>ERE 275 Ecological Engineering</td>
<td>E 3</td>
</tr>
</tbody>
</table>
"C-" is a requirement for students to pass each of the Calculus courses (i.e., Calculus 1-3) to move into a next level course. This requirement is necessary to ensure engineering students to have at least minimum quantitative skills to succeed in the ERE program. The admission office uses C as a threshold for the Calculus courses when students want to transfer into the ERE program.

### Lower Division Electives (9 credits)

<table>
<thead>
<tr>
<th>General Education Course</th>
<th>G 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Earth Science: Choose one course from FOR345, FOR338, or FCH 399)</td>
<td></td>
</tr>
<tr>
<td>General Education Course</td>
<td></td>
</tr>
<tr>
<td>General Education Course</td>
<td></td>
</tr>
</tbody>
</table>

**Explanation of General Education Courses:**

Consistent with SUNY GER, ERE students are required to have 27 credit hours of general education coursework in at least seven of the following nine subject areas to satisfy SUNY and the ERE program requirements: Basic Communication; Mathematics; Humanities; Natural Sciences; American History; Western Civilization; Other World Civilizations; The Arts; and Social Sciences. ERE Program requirements are sufficient to satisfy four of the General Education subject area requirements (12 credit hours): Basic Communication (EWP 190); Mathematics (APM 205); Natural Sciences (EFB 101) and Humanities (EWP 290). Students will elect one Earth Science-related course from a list of pre-approved courses, namely FCH 399 Introduction to Atmospheric Sciences; FOR 338 Meteorology, or FOR 345 Introduction to Soils. The directed earth sciences elective will provide depth in the Natural Sciences subject area. Students must complete the remaining twelve (12) credits of General Education courses in at least three of these General Education subject areas: American History; Western Civilization; Other World Civilizations; The Arts; and Social Sciences.

### Upper Division Required Courses (40-42 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Required</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM 395</td>
<td>Probability and Statistics for Engineers</td>
<td>M</td>
<td>3</td>
</tr>
<tr>
<td>CIE 337</td>
<td>Introduction to Geotechnical Engineering</td>
<td>ED</td>
<td>4</td>
</tr>
<tr>
<td>ERE 351</td>
<td>Basic Engineering Thermodynamics</td>
<td>E</td>
<td>3</td>
</tr>
<tr>
<td>ERE 371</td>
<td>Surveying for Engineers</td>
<td>E</td>
<td>4</td>
</tr>
<tr>
<td>ERE 440</td>
<td>Water Pollution Engineering</td>
<td>ED</td>
<td>3</td>
</tr>
<tr>
<td>ERE 335</td>
<td>Numerical and Computing Methods</td>
<td>M</td>
<td>3</td>
</tr>
<tr>
<td>ERE 340</td>
<td>Engineering Hydrology and Hydraulics</td>
<td>ED</td>
<td>4</td>
</tr>
<tr>
<td>ERE 365</td>
<td>Principles of Remote Sensing</td>
<td>E</td>
<td>4</td>
</tr>
</tbody>
</table>
Upper Division Electives (18 credits)

Directed Engineering Design Elective
An upper-division engineering course that is advisor-approved and provides the equivalent of at least one credit hour of depth in the design and synthesis component of the program. Approved directed engineering elective courses are: ERE 475 Ecological Engineering for Waste Management, ERE 551 GIS for Engineers, ERE 412 River Form and Process, and ERE 448 Open Channel Hydraulics.

Engineering Design Elective

Engineering Elective
An upper-division engineering course that is advisor-approved and provides depth in engineering analysis, design or synthesis. Pre-approved SUNY ESF engineering elective courses are:
ERE 405 Sustainable Engineering,
ERE 412 River Form and Process,
ERE 425 Ecosystem Restoration Design,
ERE 445 Hydrologic Modeling,
ERE 448 Open Channel Hydraulics,
ERE 475 Ecological Engineering for Water Quality Improvement,
GNE 461 Air Pollution Engineering,
ERE 496 and ERE 596 Special Topics courses must be pre-approved by the Department prior to registration.
ERE 496 Environmental Systems Engineering.

Pre-approved Syracuse University courses that may be used to satisfy engineering electives include:
CIE 331 Analysis of Structures and Materials,
CIE 332 Design of Concrete Structures,
CIE 338 Foundation Engineering,
CIE 443 Transportation Engineering,
CIE 473 Transport Processes in Environmental Engineering.
Special Topics courses offered through Syracuse University’s L.C. Smith College of Engineering must be pre-approved by the Department prior to registration.
500-599 Graduate courses designed expressly for areas of specialization in post-baccalaureate programs. Qualified undergraduate students may enroll with permission of the instructor.
ERE 511 Ecological Engineering in the Tropics,
ERE 527 Stormwater Management,
ERE 551 GIS for Engineers,

600-699 Graduate courses are designed expressly for advanced levels of specialization. Undergraduate students with a cumulative grade point average of 3.000 or better may enroll in these courses with an approved petition.
ERE 621 Spatial Analysis,
ERE 622 Digital Image Analysis,
ERE 674 Methods in Ecological Treatment,
ERE 692 Remote Sensing of the Environment,
ERE 693 GIS-Based Modeling

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective (No AP credits transferred/No PE courses allowed)</td>
<td>3</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
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</tbody>
</table>

Total minimum credits for the degree: **125-127** credits
Comparison of course & credit hour requirements between the OLD and NEW (proposed) Natural Resources Management degree programs

<table>
<thead>
<tr>
<th>SUNY General Education &amp; Lower Division Courses</th>
<th>(Corresponding ESF Course)</th>
<th>OLD</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen. Ed. in Communications</td>
<td>(EWP190 Writing &amp; the Environment)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Gen. Ed. in Humanities</td>
<td>(EWP290 Research, Writing &amp; Humanities)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Gen. Ed. in History</td>
<td>(FOR204 Nat. Resources in American History)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Gen. Ed. in Western Civilization</td>
<td>(FOR203 West. Civ. &amp; Environment)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Gen. Ed. in Other World Civilizations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen. Ed. in The Arts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen. Ed. in Math (Limited)</td>
<td>(APM104 College Algebra &amp; Precalculus)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Economics (Gen. Ed., Social Science)</td>
<td>(FOR207 Intro to Economics)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Biology II with lab</td>
<td>(EFB103/104 Gen. Bio II)</td>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>Chemistry I with lab (Gen Ed., Nat. Sci.)</td>
<td>(FCH150/151 Chemistry I w/lab)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry II with lab</td>
<td>(FCH152/153 Chemistry II w/lab)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>(EFB200 Physics of Life)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Ecology with lab</td>
<td>(EFB320 General Ecology)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Information Literacy</td>
<td>(ESF200 Information Literacy)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sociology</td>
<td>(FOR202 Introduction to Sociology)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Management</td>
<td>(FOR360 Principles of Management)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Prob. ability and Statistics (Gen Ed., Math)</td>
<td>(APM391 Intro to Probability &amp; Stats)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Public Speaking</td>
<td>(EWP220 Public Speaking for Environ. Professionals)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td><strong>57</strong></td>
<td><strong>46</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required Professional Courses Common to Other FNRM Degree Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESF 300 Introduction to Geospatial Information Technologies</td>
</tr>
<tr>
<td>FOR 132 Freshman orientation seminar</td>
</tr>
<tr>
<td>FOR 232 Natural Resources Ecology</td>
</tr>
<tr>
<td>FOR 304 Adirondack Field Studies</td>
</tr>
<tr>
<td>FOR 322 Natural Resources Measurement and Sampling</td>
</tr>
<tr>
<td>FOR 333 Natural Resources Managerial Economics</td>
</tr>
<tr>
<td>FOR 345 Introduction to Soils</td>
</tr>
<tr>
<td>FOR 372 Fundamentals of Outdoor Recreation</td>
</tr>
<tr>
<td>FOR 465 Natural Resources Policy</td>
</tr>
<tr>
<td>FOR 490 Integrated Resources Management</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program Specific Required Professional courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWP 405 Writing for Scientific Professionals</td>
</tr>
<tr>
<td>FOR 205 Principles of Accounting</td>
</tr>
<tr>
<td>FOR 340 Watershed Hydrology</td>
</tr>
<tr>
<td>FOR 321 Forest Ecology &amp; Silviculture</td>
</tr>
<tr>
<td>FOR 475 Human Behavior &amp; Recreational Visitor Management</td>
</tr>
<tr>
<td>FOR 485 Business Law</td>
</tr>
<tr>
<td>LSA 333 Plant Materials</td>
</tr>
<tr>
<td>Subtotal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upper Division directed electives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Free electives</td>
</tr>
</tbody>
</table>

TOTAL | 122 | 122

* NRM majors can take EFB103 Biology II lecture (3 credits) in place of FOR232 Natural Resources Ecology

** Directed electives as follows:

Wildlife or Fisheries Directed Electives (3 credit hours) -- EFB390 Wildlife Ecology and Management, EFB487 Fisheries Science and Management, or EFB413 Introduction to Conservation Biology

Specialized NRM Directed Electives (3 credit hours) -- FOR489 Natural Resources Law, FOR476 Ecotourism and Nature Tourism, FOR553 Advanced Forest Soils, FOR 334 Silviculture, FOR433 Silviculture Workshop, FOR442 Watershed Ecology and Management, or a second wildlife/fisheries course.
Bachelor of Science in Natural Resources Management

The natural resources management program is based on a vision that combines professional competency in management skills with a strong foundation in the social and biophysical sciences. Students interested in this program typically are drawn to natural settings and environments, enjoy nature and want to develop the professional knowledge and skills needed to conserve, steward and manage natural resources and the environment. ESF provides a wide variety of opportunities to meet student needs utilizing 25,000 acres of forest lands as teaching laboratories and College faculty in many natural resource management disciplines. Experiential field learning is combined with learning concepts and skills in the classroom and laboratory on ESF’s Syracuse campus.

The natural resources management program allows students to develop professional skills that employers tell us are the most important traits they look for in new employees. These traits are developed through a broad base of classes in the natural sciences, social sciences and humanities, communication, and quantitative and qualitative problem-solving skills. The majority of work scheduled during the first two years (lower division) is in these areas. This major prepares students to be well-rounded natural resources managers, provides them a ready opportunity to minor in specific areas of disciplinary interest, and prepares them with a foundation for future graduate degree work.

Natural resources management offers a wide variety of employment opportunities. Graduates work throughout the United States in public agencies, private industry, and for nonprofit organizations. Their duties range from policy analysis for federal agencies to resource managers for nonprofit organizations; from recreation planning for state park agencies to recreation management in federal wilderness areas; and from watershed hydrologists to land managers maintaining surface water quality.

Summer Program

The Summer Program is required for ALL students in natural resources management. Students who completed an A.A.S. degree from the ESF Ranger School meet this requirement through transfer credits. The summer program is a four-week session that begins at the end of May and lasts through late June. It is taught at ESF’s Wanakena Campus in the Adirondacks. The program consists of one course: FOR 304 Adirondack Field Studies. Students should complete the summer program before the junior year.

Program Admission

Students may follow one of three paths to enter and complete the natural resources management program:

The freshman path is for students who enter ESF as a freshman and complete all degree requirements at ESF with the Summer Program after the first or second year (first year preferred).

The combined A.A.S./B.S. path is for students who wish to have more field measurement and field problem-solving skills and leadership development in context of forestry problems. The first year can be at ESF or another campus and the second year is spent at The Ranger School, Wanakena campus. Students then complete their B.S. degree requirements at ESF. This path can usually be completed in a total of four years.

The transfer path is for students who complete all or part of their lower-division coursework at another two- or four-year campus, attend the Summer Program the summer before entering ESF and complete the upper-division requirements at ESF. Students preparing to transfer to ESF with full junior status must have earned at least 60 credits of college coursework.
### Undergraduate Program Requirements

#### Lower Division Required Courses (540 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APM 104</td>
<td>College Algebra and Precalculus</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Meets the requirements for general education skills and knowledge area. A complete listing of ESF or Syracuse University courses can be found in the SUNY Undergraduate Education.</em></td>
<td></td>
</tr>
<tr>
<td>APM 391</td>
<td>Introduction to Probability and Statistics</td>
<td></td>
</tr>
<tr>
<td>CLL/FWP 190</td>
<td>Writing and the Environment</td>
<td></td>
</tr>
<tr>
<td>EWP 290</td>
<td>Research, Writing and Humanities</td>
<td>G 3</td>
</tr>
<tr>
<td>CMS/FWP 220</td>
<td>Public Presentation Skills for Environmental Professionals</td>
<td>3</td>
</tr>
<tr>
<td>EFB 101/102</td>
<td>General Biology I and Laboratory</td>
<td>G 4</td>
</tr>
<tr>
<td>EFB 103/104</td>
<td>General Biology II and Laboratory, or</td>
<td>34</td>
</tr>
<tr>
<td>FOR 232</td>
<td>Natural Resources Ecology</td>
<td></td>
</tr>
<tr>
<td>EFB 320</td>
<td>General Ecology</td>
<td>4</td>
</tr>
<tr>
<td>ESF 200</td>
<td>Information Literacy</td>
<td>1</td>
</tr>
<tr>
<td>FCH 150/151</td>
<td>General Chemistry I and Laboratory</td>
<td>G 4</td>
</tr>
<tr>
<td>FCH 452/453</td>
<td>General Chemistry II and General Chemistry Laboratory II</td>
<td>34</td>
</tr>
<tr>
<td>HAX 411</td>
<td>General Physics I and General</td>
<td></td>
</tr>
<tr>
<td>EFB 200</td>
<td>Physics Laboratory I</td>
<td></td>
</tr>
<tr>
<td>FOR 132</td>
<td>Orientation Seminar: Forest and Natural Resources Management</td>
<td>PE 1</td>
</tr>
<tr>
<td></td>
<td><em>Required for all students (freshmen and transfers). Professional education course</em></td>
<td></td>
</tr>
<tr>
<td>FOR 202</td>
<td>Introduction to Sociology</td>
<td>3</td>
</tr>
<tr>
<td>FOR 203</td>
<td>Western Civilization and the Environment</td>
<td>G 1</td>
</tr>
<tr>
<td>FOR 204</td>
<td>Natural Resources in American History</td>
<td>G 3</td>
</tr>
</tbody>
</table>

**Comment [SE1]:** I "unaccepted" the change that was made to the original submission -- resetting APM 104 as the basic math course instead of APM 103, as originally proposed. This also remarks one of the missing Gen Ed courses -- so we have noted 3 more credit hours of GE to clearly bring this up to the needed 27 credit hours. C. Nowak
### Lower Division Elective Courses (18 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>G</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOR 207</td>
<td>Introduction to Economics</td>
<td>G</td>
<td>3</td>
</tr>
<tr>
<td>FOR 360</td>
<td>Principles of Management</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

### Required Summer Courses (4 credits)

The summer following the first or second year, students must take:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>PE</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOR 304</td>
<td>Adirondack Field Studies</td>
<td>PE</td>
<td>4</td>
</tr>
</tbody>
</table>

### Upper Division Required Courses (4130 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>PE</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLLUWP 405</td>
<td>Writing for Science Professionals</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>ESF 300</td>
<td>Introduction to Geospatial Information Technologies</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>FOR 205</td>
<td>Principles of Accounting</td>
<td>PE</td>
<td>3</td>
</tr>
<tr>
<td>FOR 321</td>
<td>Forest Ecology and Silviculture</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>FOR 322</td>
<td>Natural Resources Measurements and Sampling</td>
<td>PE</td>
<td>3</td>
</tr>
<tr>
<td>FOR 333</td>
<td>Natural Resources Managerial Economics</td>
<td>PE</td>
<td>3</td>
</tr>
<tr>
<td>FOR</td>
<td>340</td>
<td>Watershed Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>---------------------</td>
<td>---</td>
</tr>
<tr>
<td>FOR</td>
<td>345</td>
<td>Introduction to Soils</td>
<td>PE 3</td>
</tr>
<tr>
<td>FOR</td>
<td>372</td>
<td>Fundamentals of Outdoor Recreation</td>
<td>3</td>
</tr>
<tr>
<td>FOR</td>
<td>465</td>
<td>Natural Resources Policy</td>
<td>PE 3</td>
</tr>
<tr>
<td>FOR</td>
<td>475</td>
<td>Human Behavior and Recreational Visitor Management</td>
<td>2</td>
</tr>
<tr>
<td>FOR</td>
<td>4858</td>
<td>Natural Resources Agency and Administration Business Law</td>
<td>3</td>
</tr>
<tr>
<td>FOR</td>
<td>490</td>
<td>Integrated Resources Management</td>
<td>PE 3</td>
</tr>
<tr>
<td>LSA</td>
<td>333</td>
<td>Plant Materials</td>
<td>2</td>
</tr>
</tbody>
</table>

Upper Division Elective Courses (27 credits)

| Accounting or Finance Course: ACC 301 Introduction to Accounting for Non-Major Students (3) or FIN 301 Finance for Non-Major Students (3) | 3 |
| Human Dimensions Course: ECO 301 Social Processes and the Environment (3), FOR 317 Sociology of Natural Resources (3), or FOR 475 Human Behavior and Recreation Visitor Management (3) or Specialized NRM Course | 3 |
| FOR 459 Natural Resources Law, FOR 476 Ecotourism and Nature Tourism, FOR 535 Advanced Forest Soils, FOR 334 Silviculture, FOR 433 Silviculture Workshop, FOR 442 Watershed Ecology and Management, or a second wildlife/fisheries course. | |
| Wildlife or Fisheries Course: EFB 390 Wildlife Ecology and Management (4) EFB 487 Fisheries Science and Management (3) or EFB 493 Wildlife Habitats and Populations (4) or Introduction to Conservation Biology. | 3 |
| Electives | 21 |

Total minimum credits for the degree 122 credits