1. Course Information:

1.1 Course Prefix and Number: FOR 313
Course Title: Tree Structure and Function
(If a new or renumbered course, please check with the Registrar regarding the use or reuse of the course number)

1.2 ☑ This is a New Course.
OR
☐ This is a Major Course Revision
OR
☐ This is a Minor Course Revision

If this is a Course Revision, please see Course Proposal Form – Instructions and Guidance to determine if your revision is major or minor. Indicate below the reason(s) for the revision.

(Please check all that apply)

☐ Course Number/Division ☐ Learning Outcomes ☐ Institutional Resources
☐ Title ☐ Concepts, Content ☐ Semester Offered
☐ Credit hours ☐ Catalog Description ☐ Course Inactivation
☐ Pre- or Co-requisite(s) ☐ Instructional Methods ☐ Course Reactivation
☐ Format ☐ General Education

1.3 General Education knowledge and skills area (if applicable): If none, check here ☑

☐ American History ☐ Humanities ☐ Other World Civilizations
☐ The Arts ☐ Mathematics ☐ Social Sciences
☐ Basic Communication ☐ Natural Sciences ☐ Western Civilization
2. Proposer Need Statement:

2.1 Describe why this course (or course revision) is needed to meet current or proposed goals and outcomes of the program or College, and, if a revision, provide an explanation of and justification for the revision.

Tree physiology is not currently taught to students in Forest Resources Management (FRM) major, but is specifically required for accreditation through the Society of American Foresters. This course has been added as a required course in the proposed FRM curriculum revision. After taking this class, students will have a fundamental knowledge of tree structure and function that will prepare them to understand how and why trees are managed for human uses.

2.2 List the pre-requisite or co-requisite courses (taught within the home department or taught by another department) and explain their relationship to the proposed course.

Students are expected to have prior exposure to cellular and/or organismal biology at an introductory level. This pre-requisite class will provide the foundation of introductory biology that students will need to access material taught in class.

2.3 Explain the impact of this course in meeting the goals and outcomes of other Departments/programs (if any).

This course is primarily aimed at students in the FRM major, who aspire to be practicing foresters. This course could be taken by interested students as an elective in other FNRM majors (e.g., Forest Ecosystem Science, Natural Resources Management) and other departments (e.g., EFB-Environmental Biology, Forest Health, Conservation Biology). This class may benefit EFB in particular, which hasn't offered "Botany" in many years.

2.4 If the proposed course is designed to fulfill SUNY General Education Requirements, the Associate Provost for Instruction must review this proposal to ensure that General Education Requirements will be met for the specified knowledge area (See Instructions and Guidance). Please provide an explanation of how this course fulfills SUNY General Education Requirements. Not applicable

2.5 What are the staffing requirements (instructor, TA, Lab tech, etc.) for this course? If a new course, are there new staffing needs or are there adequate staff members already in place? If a revised course, are there additional staffing needs?

Adequate instructional staff are already in place, no new faculty will be needed. If enrollment increases to 40 – 60 students, the class could appropriately be allocated half of a GA, particularly to support active learning exercises that will require splitting the class into two groups (e.g., observations of trees on campus and in the cemetery when teaching crown form, microscopy observations of tree cores and wood slides).

2.6 What Department (or extra-Department) resources are or will be made available to support the course or course revision? None.

2.7 Anticipated Enrollment (enter where applicable)

Fall Semester: 20 – 30  
Spring Semester: 60

Summer Semester: 20 – 30

2.8 Anticipated frequency of class meetings. 2 per week
3. DETAILED COURSE DESCRIPTION

3.1 COURSE IDENTIFICATION AND FORMAT:

3.1.1 Course Prefix and Number: FOR 313
3.1.2 Course Name: Tree Structure and Function
3.1.3 Credit Hours: 3
3.1.4 Semester (check all that apply): Fall ☑ Spring ☐ Summer ☐
3.1.5 Format (check as appropriate): Lecture ☑ Online ☐ Lab ☐ Field ☑ Other ☐ (explain)
3.1.6 Contact hours per week: 3
3.1.7 Prerequisite(s) – if none, please enter “None” (Be specific, as Upper Division courses and Graduate courses will likely have some pre-requisite knowledge) Students are expected to have prior exposure to cellular and organismal biology at an introductory level.

3.2 SCOPE:

3.2.1 Level of Instruction (check one, or two if a shared resource course):
   - Lower Division ☐
   - Upper Division ☑
   - Beginning Graduate ☐
   - Advanced Graduate ☐

3.2.2 Relation to curriculum or to other ESF or Syracuse University courses:
   a. Is this a required course? No ☐ Yes ☑.
      If Yes, please list the program(s) for which it is a requirement: Forest Resources Management
   b. Is this an elective course within your department? No ☑ Yes ☐.
   c. Is enrollment in this course restricted? No ☑ Yes ☐.
      If Yes, please explain:
   d. Are other ESF or SU courses similar or identical to this course? No ☑ Yes ☐.
      If Yes, please identify the courses:
   e. Is this course a shared resource offering (i.e. is there a graduate or undergraduate concurrent offering)? No ☑ Yes ☐.
      If Yes, what is the course number of the concurrent offering?

3.3 STUDENT LEARNING OUTCOMES:

Identify the student learning outcomes associated with this course.

By the end of the course, the student will be able to:

- Identify the structure of tree organs and how they are connected.
- Identify the resources that trees require for growth and reproduction, and describe how trees acquire these resources.
- Describe the physiological and biochemical process by which trees convert sunlight into stored chemical energy, and how that stored energy is utilized.
- Describe how trees defend themselves against pests and pathogens, and how these defenses can fail.
- Describe the impacts of climate, fire, pollutants, moisture, nutrients, genetics, insects, and diseases on tree and forest health and productivity.
Apply an understanding of tree physiology to predict the impact of management interventions.

Evaluate novel management techniques regarding their impact on trees and forests.

3.4 MAJOR CONCEPTS, PROCESSES or TOOLS:

Identify the course content and themes (e.g. Table of Contents) consistent with the learning domains and outcomes.

Leaf structure and function

Wood structure and function

What are trees made of? Macro and micronutrients (focusing on C, N, K, Ca, P).

Roots: Structure of coarse and fine roots, structural support, water, and nutrient acquisition

Mycorrhizae

Reproductive biology

Seed strategies of trees

Growth: tree architecture, buds, branching, crowns, hormonal control of growth

Phenological transitions: budbreak and flowering

The regeneration niche

Shade tolerance and intolerance

Traits of trees in hydric - mesic - xeric habitats

Tree defenses

Tree responses to management- herbicides, wood grades, microenvironment

Tree physiological responses to climate, fire, nutrients, and pollutants

3.5 INSTRUCTIONAL METHODS:

Identify the methods used to meet the course outcomes, as well as the principal instructional methods.

Lectures (many in person, some recorded and delivered via a flipped classroom model to facilitate using class time for active learning exercises)

Observations of trees in field settings close to campus (i.e., achievable within a 90-min "lecture" period, without specific lab sections)

Examination of specimens (branches, buds, microscopy slides)

Class discussions around conceptual areas of controversy (do trees communicate belowground via shared mycorrhizal networks? how will tree distributions shift with climate change? how should we manage beech in a post beech-bark disease world?).
3.6 **CATALOG DESCRIPTION**

Provide the course description using the precise format to be included in the ESF catalog (i.e. course number and title; format; brief description; semester(s) offered; and pre-/co-requisites). Please do not exceed 1000 characters.

FOR 313 Tree Structure and Function. Three hours of lecture/discussion per week, including regular observations of trees near campus. Students will learn the fundamental biology of the structure and physiological function of trees, to prepare them to understand how and why trees are managed for human uses. Fall. Prerequisite- introductory biology.

3.7 **COURSE HISTORY:**

Provide the dates of prior approval of this course, and its revision history. None.

3.7.1 **Relationship to current ESF courses**

This course is replacing a current ESF course  ☐ YES ☒ NO

If NO, then proceed to section 4 below.

If YES, then provide below the number and name of the course to be deactivated and removed from the catalog once this course proposal has been approved:

Course Number (of the course to be replaced)
Course Name (of the course to be replaced)

If the course to be replaced is used by departments other than the department sponsoring this proposal, please indicate below which departments are affected and the date they were notified about the course replacement.

Department: Date of Notification:
Department: Date of Notification:
Department: Date of Notification:
Department: Date of Notification:
4. Institutional Impacts:

This section pertains to forecasting institutional resource needs to support the course or course revision. Provide clear statements regarding the needs and current availability (or absence) of resources. Note that, if this is a course revision, only the impacts of the revision should be included.

<table>
<thead>
<tr>
<th>Staffing needs:</th>
<th>1 instructor, 1/2 a GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom resources</td>
<td>A typical classroom</td>
</tr>
<tr>
<td>(e.g. physical facilities in a laboratory, lecture hall, flexible space, academic computing):</td>
<td></td>
</tr>
<tr>
<td>Technology Resources:</td>
<td>Overhead projector or large screen for displaying slides</td>
</tr>
<tr>
<td>Computing Resources</td>
<td>None</td>
</tr>
<tr>
<td>(software licensing, hardware, access):</td>
<td></td>
</tr>
<tr>
<td>Library Resources</td>
<td>None</td>
</tr>
<tr>
<td>(subscriptions, services):</td>
<td></td>
</tr>
<tr>
<td>Transportation Requirements</td>
<td>None. Field observations will be done within easy walking distance of campus.</td>
</tr>
<tr>
<td>(budget, fees, fleet vehicles):</td>
<td></td>
</tr>
<tr>
<td>Forest Properties or Field Practicum Facilities:</td>
<td>None. Field observations will be done within easy walking distance of campus.</td>
</tr>
</tbody>
</table>
5. Health and Safety Considerations:

Will any of the conditions or situations outlined below be present in association with the course? Yes / No

5.1. Will substances with any of the following properties be used during instruction: flammability, toxicity, corrosivity, reactivity, registered pesticide, legally controlled, or other characteristics with the potential to cause harm or injury? ☐ / ☑

5.2. Will any physical hazards be present during instruction? (e.g., machines that need safety guards; razor blades or syringes; compressed gases, etc.). ☐ / ☑

5.3. Will any biological hazards be present during instruction? (e.g., handling animals (rabies or hantavirus); cultures or stocks of infectious agents (fungal spores, viruses, bacteria, etc.). ☐ / ☑

5.4. Will any radiation hazards be present during instruction? (e.g., radioisotopes, X-rays, ultraviolet rays, lasers, etc.). ☐ / ☑

5.5. Will any electrical equipment that, due to its design, location, or method of use, pose any threat to safety during instruction? (Give considerable thought to electrical use outdoors, or any potentially wet location.). ☐ / ☑

5.6. Will there be any personal safety issues related to the class? (e.g., due to time of day or location, at the end of any organized class exercise, will students be in danger of physical assault, etc.). ☐ / ☑

5.7. Will any students be driving official state or research sponsored land or water vehicles during any class or instructional exercise? ☐ / ☑

5.8. Will any type of personal protective equipment be necessary during class exercises? (e.g., hard-hats, eye/face protection, hearing protection, hand/foot protection, lab coat, visibility clothing, etc.) ☑ / ☐

If the answer was “Yes” to any of the HEALTH AND SAFETY questions, please explain:

Personal protective equipment will be required during field exercises. Due to the potential for falling debris (e.g., stems and branches) in forested settings, students will be required to wear hardhats that meet or exceed the ANSI Z89.1-1986, Class A and B standards. Due to uneven terrain encountered in many forest laboratory sites, students will be required to wear boots that provide ankle support and protection. Due to the abrasion from low-growing forest vegetation, students will be required to wear long pants during all forest exercises. Use of hardhats, boots and long pants during forest laboratories is policy in the Department of Forest and Natural Resources Management.

For lab and field courses to which all answers are “no”, you should explain that here, also. Normally, we would expect some safety precautions for such courses.
6. Coordination and Consultation

Emails/letters, as noted below and attached to this proposal, or signatures below, indicate that the
affected departments, programs or units have been notified of this proposal and have had an opportunity
to assess the impact of the proposal on their respective units.

Affected Academic Department(s) or Program(s) – other than the sponsoring department:

Environmental and Forest Biology_____________________________ Dr. Melissa Fierke

Department/Program 1__________________________________________ Name of Chair/Program Director

Chair Signature

Date

Department/Program 2__________________________________________ Name of Chair/Program Director

Chair Signature

Date

Department/Program 3__________________________________________ Name of Chair/Program Director

Chair Signature

Date

[if more than three Departments/Programs, please continue on a separate page]

Other Units:

Associate Provost for Instruction & Dean of the Graduate School (for Gen Ed courses only) ____________________________ Or letter attached Date

Registrar

Date

Library Director

Date

Computing and Network Services

Date

Physical Plant

Date

Forest Properties

Date

Environmental Health and Safety

Date
7. Proposer Information and Sponsoring Department Chair
Affirmation:

Contact Person:
Name: Dr. John Drake ____________________________ Department: Forest and Natural Resources Management ______________________
Email: jedrake@esf.edu ____________________________ Phone: (315) 470-6574

This proposal has been reviewed and approved by the sponsoring Department. Affected departments have been notified and given the opportunity to provide feedback. Department resources are or will be made available to support the course, or a plan is in place to meet the resource needs as identified in the Institutional Impacts section of this proposal (see Section 4, above).

Name: Chris Nowak ____________________________
Date: 10/28/19
Department Chair (or designated curriculum representative)
Signature: ____________________________
Department Chair (or designated curriculum representative) Or letter attached

8. Approvals:

_________________________ __________________________
Curriculum Committee Date

_________________________ __________________________
Faculty Governance Date

_________________________ __________________________
Provost Date