This course proposal form should be completed when introducing a new course or a revision of an existing course. The proposal will be reviewed by the Committee on Curriculum, or, in the case of minor revisions, will be approved administratively by the Associate Provost for Instruction.

This Course Proposal must be completed according to the guidelines provided in Course Proposal Form – Instructions and Guidance. Please see the last page of Course Proposal Form – Instructions and Guidance, for instructions on how this Course Proposal should be submitted to the Committee on Curriculum for review.

Date: 4/27/21

1. Course Information:

1.1 Course Prefix and Number: EFB 350
Course Title: Microbial Consortia
(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. Over the 22+ years that I have taught at ESF I have focused on providing instruction in both Mycology (EFB 440/640) and Diversity of Life (EFB 210/211). The latter courses have been requirements in EFB while the former has satisfied "Directed Elective" requirements in Organismal Biology. These classes typically cover a vast array of sub-topics set against a backdrop of groups that are recognized as both "hyperdiverse" and "poorly known". As a result, it has not been possible to cover some of the more interesting but peripheral groups in sufficient detail to provide students with adequate understanding. Over the years I have taught a number of EFB 496 classes to try to address these lacunae, focusing on for example, Biology of Lichens, Biology of Slime Molds, and, Fungal-Insect Interactions. Recent groundbreaking research on both the universality and diversity of microorganisms is now leading to a re-working of fundamental theories in biology and a new vision of the pivotal importance of microbiology. In recognition of these fundamental changes, I recently began offering an EFB-496 entitled Microbial Consortia that focuses on lichens, slime molds, biofilms, and myxobacteria. This course is needed to round out an undergraduate education in mycology/microbiology and will also benefit students with interests in multi-species interactions and symbioses. Although misunderstood and neglected for much of the past 200 years, the molecular revolution is providing both timely and compelling reasons for bringing these organisms to the attention of students, researchers, and the general public. Enrollments in the abovementioned EFB 496 courses have averaged around 20 students and recent ESF graduates who have completed this course (as EFB 496) or its forerunners (also EFB 496) have been subsequently employed by organizations such as the Bureau of Land Management to undertake surveys/studies of lichens and biofilms.

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. One year of Introductory Biology and EFB-210 - Diversity of Life I or EFB-211 - Diversity of Life II. Students need to have a basic understanding of biological and cellular principles and an appreciation of the diversity of life at local, regional, and global scales. This class will include bi-weekly discussion of relevant papers and students will be required to critique these papers.

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

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. N/A

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? There are no new staffing needs for this class. I will teach this class during Spring semester.
2.6 What Department (or extra-Department) resources are or will be made available to support the course or course revision? A lab with access to microscopes (both compound and stereo) for each student has been made available during the last few years and will be needed in the future. I have also drawn heavily on our existing resources in the Fungarium (historical collections of dried specimens of representative taxa) on the 4th Floor of Illick Hall. Additionally, students in this class have utilized both the N.C. Brown Ultrastructural Center (for use of the Scanning Electron Microscope) and the Biochemistry lab in the Department of Chemistry for a single lab focused on secondary chemicals (thin-layer chromatography) in lichens. There will also likely be transportation needs for 2-3 field-based labs during the semester using bus transportation.

2.7 Anticipated Enrollment (enter where applicable)

<table>
<thead>
<tr>
<th></th>
<th>Fall Semester</th>
<th>Spring Semester</th>
<th>Summer Semester</th>
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<tbody>
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<td></td>
<td></td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

2.8 Anticipated frequency of class meetings. Two lectures/discussion groups and one 3-hour lab per week.
3. DETAILED COURSE DESCRIPTION

3.1 COURSE IDENTIFICATION AND FORMAT:

3.1.1 Course Prefix and Number: EFB 350
3.1.2 Course Name: Microbial Consortia
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: 6
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) One year of Introductory Biology and either EFB 210 or EFB 211.

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:
   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. Upon completion of this course students will be able to:

Explain aspects of the basic biology, to include morphology/anatomy, physiology/metabolism, reproduction, evolution, and ecology of target groups (principally lichens, slime molds, and myxobacteria).

Identify common species in both Central New York and Eastern North America and have an understanding of higher level groupings across the whole of North America.

Describe the development of thought on the evolutionary origins of target groups.
Use and describe the various methods of study for target groups to include field collection, lab dissection, scanning electron microscopy, chemotaxonomic approaches, routine maintenance of cultures, molecular methods and preservation techniques.

Describe the currently known components of the microbial consortia studied and their functional relationship to the whole, recognizing the importance of cooperation and collaboration in the life histories of these organisms.

Critique the current and past scientific literature on these organisms with an understanding of the context and the limitations of methods used.

Describe approaches to conservation of these organisms and their potential utility to humans.

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.

Definitions, applications and the history of thought regarding these organismal groups

Nomenclatural anomalies and procedures

The Lichen Habit - the relationship between morphology, anatomy, and physiology

Lichens as complex ecosystems

Reproductive modes and success in lichens

Lichen chemistry, chemotaxonomy, and pollution monitoring

Chemical tests, thin layer chromatography, scanning electron microscopy, light microscopy (tools)

Ecology, evolution and conservation of lichens

Structural features of slime molds

Origin and evolution of slime molds

Experiments on slime mold behavior

Basic features of Myxobacteria and bacterial biofilms

3.5 INSTRUCTIONAL METHODS:

Identify the methods used to meet the course outcomes, as well as the principal instructional methods. Classroom lecture supported by reading/discussion assignments and hands-on lab and field exercises with an emphasis on methods, key features, and species identification. Students
are evaluated through exams, lab quizzes, written critiques of exemplar papers, and participation in class discussions.

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. EFB 350 Microbial Consortia (3) Two hours of lecture/discussion and a three-hour lab per week. This class provides an introduction to the biology of lichens, slime molds, gliding bacteria (Myxobacteria) and bacterial biofilms. Emphasis is on understanding the role of each component in the functioning of these microbial consortia either as complex multi-species ecosystems (lichens and biofilms), or as single species “superorganisms” (slime molds and Myxobacteria). Against this background of cooperation and collaboration, students will be introduced to the anatomy, morphology, systematics and evolution, physiology, and ecology of these overlooked groups through weekly lectures/discussions. Lab will focus on methods used to study these organisms and on characters used in species level identifications. Current initiatives in the conservation of lichens will also be discussed. Spring. Prerequisites: One year of Introductory Biology and either EFB 210 or EFB 211.

3.7 COURSE HISTORY:

Provide the dates of prior approval of this course, and its revision history. N/A

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>One faculty instructor</th>
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<tbody>
<tr>
<td>Classroom resources (e.g. physical facilities in a laboratory, lecture hall, flexible space, academic computing):</td>
<td>Classroom/lab able to seat 20 students and both compound and stereo microscopes for each student. Access to running water (sink) and autoclave (sterilization of cultures). Access to, and use of, historical collections housed in the Fungarium on the 4th Floor of Illick Hall.</td>
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<tr>
<td>Technology Resources:</td>
<td>Facilities for displaying images and lecture presentations to students such as computers and digital projectors</td>
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<tr>
<td>Computing Resources (software licensing, hardware, access):</td>
<td>Network/internet access, Microsoft Powerpoint software or equivalent</td>
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<tr>
<td>Library Resources (subscriptions, services):</td>
<td>Access to existing print and digital Moon Library holdings. Specific texts to be purchased or put on reserve will be listed by the instructor and provided to library staff. Student internet access/study areas.</td>
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<tr>
<td>Transportation Requirements (budget, fees, fleet vehicles):</td>
<td>Bus transportation for 20 students and teaching staff on 2 or 3 afternoons during the Spring semester for Field trips.</td>
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<tr>
<td>Forest Properties or Field Practicum Facilities:</td>
<td>Likely visits to local sites in the Syracuse area.</td>
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</table>
5. Health and Safety Considerations:

Will any of the conditions or situations outlined below be present in association with the course?  

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: There will be one lab focused on thin-layer chromatography in lichens and this will involve students handling acetone and potentially other solvents. In past years this lab has been coordinated through the Department of Chemistry and students have been informed of all potential hazards and are provided with lab coats, eye protection and gloves, as well as instruction on the correct handling of chemicals. An ultra-violet light box is also used in this lab to help visualize results and students are briefed on the use of this and provided with protective visors. Razor blades are also used routinely in the labs throughout this course to aid dissections and students are informed of the correct procedure for using these. A first aid kit is available in lab in case of any minor incidents.

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:

<table>
<thead>
<tr>
<th>Department/Program</th>
<th>Name of Chair/Program Director</th>
<th>Chair Signature</th>
<th>Date</th>
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<tbody>
<tr>
<td>Department/Program 1</td>
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<td>Department/Program 2</td>
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<td>Department/Program 3</td>
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(If more than three Departments/Programs, please continue on a separate page)

Other Units:

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<tr>
<td>Associate Provost for Instruction &amp; Dean of the Graduate School</td>
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<tr>
<td>Registrar</td>
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<td>Library Director</td>
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<td>Computing and Network Services</td>
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<td>Forest Properties</td>
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<tr>
<td>Environmental Health and Safety</td>
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7. Proposer Information and Sponsoring Department Chair

Affirmation:

Contact Person:
Name: Alex Weir _______________________________ Department: Environmental Biology
Email: aweir@esf.edu _______________________________
Phone: x6791 _______________________________

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: Melissa K. Fierke _____________________________ Date: April 27, 2021
Department Chair (or designated curriculum representative)
Signature: ________________________________ Or letter attached □
Department Chair (or designated curriculum representative)

8. Approvals:

__________________________________________________ __________________
Curriculum Committee       Date
__________________________________________________ __________________
Faculty Governance       Date
__________________________________________________  __________________
Provost         Date