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:  Feb 8, 2021

1. Course Information:

1.1 Course Prefix and Number:  EFB 370
   Course Title:  Population Ecology and Management
   (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. This course is a core requirement for students in the Conservation Biology major and will serve as a directed elective in the Wildlife Science, Aquatic and Fisheries Science, and Environmental Biology majors. The course is intended to offer undergraduate students a comprehensive, quantitative and applied course in population biology and management. It will serve as a useful quantitative course for students in other departments who have an interest in population management.

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. Pre-requisite: General Ecology (EFB320) or equivalent.

2.3 Explain the impact of this course in meeting the goals and outcomes of other Departments/programs (if any). This course is not intended to fulfill learning outcomes of other ESF departments. It may be of interest to upper-division biology students at Syracuse University.

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? This course will require one GA for the lecture section as well as and one additional GA for labs. The lecture GA will help with grading, work with students to explore current literature and will present one lecture on their area of expertise. Lab GA(s) will, run the lab(s), work students through problem sets and group work, as well as facilitate computer simulations.

2.6 What Department (or extra-Department) resources are or will be made available to support the course or course revision? The required GAs are committed as warranted by enrollment.

2.7 Anticipated Enrollment (enter where applicable)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Anticipated Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>60</td>
</tr>
<tr>
<td>Spring Semester</td>
<td></td>
</tr>
<tr>
<td>Summer Semester</td>
<td></td>
</tr>
</tbody>
</table>

2.8 Anticipated frequency of class meetings. Two 1-hour lectures per week. One 3-hour lab per week, with each lab section having a maximum of 30 students
3. DETAILED COURSE DESCRIPTION

3.1 COURSE IDENTIFICATION AND FORMAT:

3.1.1 Course Prefix and Number: EFB 370
3.1.2 Course Name: Population Ecology and Management
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: 5
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) Ecology EFB320, or equivalents.

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: Conservation Biology Major
   b. Is this an elective course within your department? No ☐ Yes ☑
   c. Is enrollment in this course restricted? No ☐ Yes ☑
   If Yes, please explain: This course will be a requirement for ConBio, and a directed elective for Wildlife, Aquatics & Fisheries, and ENB majors. Enrollment will be restricted to students in these and other majors administered by EB Department.
   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 this course students will be able to:

1) Express mathematically and verbally the formulae that regulate the growth of populations

2) Design equations about population growth given verbal and textual information.

3) Explain the scales of organization from molecules to ecosystems through which population ecology is influenced, including linkages among population genetics, population demography, and multi-species interactions.
4) Apply and interpret analytical methods for monitoring/modeling population growth of animals and plants.

5) Identify major threats to populations and create appropriate management actions to help maintain those populations.

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.

Population growth can be modeled by using a series of equations, and that those equations build upon each other. We will first focus on logistic and exponential growth, then expand into the ideas of carrying capacity and the niche, with further investigations of linking multiple populations together through metapopulation ecology (Learning Objectives 1, 2, and 4).

We will also explore the demography of populations - understanding how individuals are brought into a population, how they age, and ultimately how they leave a population. This will include population matrices as well as discussions of life-history traits (Learning Objectives 1, 2, and 4).

Biodiversity is constructed over multiple scales. We will therefore focus on variation within a population through the use of genetic techniques. Topics in population genetics will include Hardy-Weinberg equilibrium, drift, and natural selection (especially as they pertain to small populations). These classic ideas in population genetics will then be placed in a modern context by looking at genomics and the applications of next generation sequencing. We will link the micro to the macro by looking at phylogeography. We will discuss methods necessary to collect data underpinning these models (Learning Objectives 3, 4).

We will move beyond single population models to explore how genes and individuals are impacted by external factors ranging from interactions with other populations through complex multi-species interactions. This will include interactions that can be beneficial (mutualisms) or harmful (predation, parasitism). Special emphasis will be placed on the methods and skills necessary to assess population trends. (Learning Objectives 1, 2, 3, and 4).

These interactions have demonstrable conservation and management impacts, particularly when applied to both small and managed/harvested populations. Here, we will explore the real-world impacts of population management, including trophic cascades, predator introductions, and landscapes of fear. We will also emphasize that population management does not exist outside of a social context and will use the idea of human/wildlife conflict and the trade in wild products (e.g., "Bushmeat"), and fisheries to illustrate the complexities within which these concepts exist. (Learning Objective 5).

3.5 INSTRUCTIONAL METHODS:

Identify the methods used to meet the course outcomes, as well as the principal instructional methods. This course will be composed of a combination of weekly lectures and literature discussions to meet the course outcomes. We will also have one 3-hour lab per week, led by the GA(s), that will focus on problem sets, discussions, and guided computer simulations. Lecture and discussion will focus on course topics, case studies and scientific papers. Evaluation will include tests, discussions, lab reports, quizzes and problem sets. Text is tentatively "Introduction to Population Biology" by Dick Neal (Cambridge University Press).
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. Two hours of lecture and discussion per week plus a 3-hour lab. An introduction to population ecology and genetics with consideration of their impact on population management. An integration of biological systems from molecular to ecosystem levels, with an emphasis on demystifying mathematical expression of complex ecological phenomena. We will draw on examples ranging from genetic diversity to human/wildlife conflicts to explore their influences on the maintenance of wild populations. Spring. Prerequisite: General Ecology or equivalent.

3.7 COURSE HISTORY:

Provide the dates of prior approval of this course, and its revision history. A similar course was taught from 1976 - 1981 under the number 522. EFB 311 (Evolution) was originally taught with some of the population ecology topics.

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 instructor and GA for the lecture section, plus one additional GA per 30 students for the lab section(s).</th>
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</thead>
<tbody>
<tr>
<td>Classroom resources (e.g. physical facilities in a laboratory, lecture hall, flexible space, academic computing):</td>
<td>Large lecture hall, smaller room for lab.</td>
</tr>
<tr>
<td>Technology Resources:</td>
<td>Computer and projection capabilities for lecture, lab space will require computer access for pairs of students. Students will need access to computing resources outside of scheduled class time for problem sets.</td>
</tr>
<tr>
<td>Computing Resources (software licensing, hardware, access):</td>
<td>The lab sections will require at least 15 computers (PC preferable) as well as a computer and projection capabilities. All software will be open access and will not require purchase.</td>
</tr>
<tr>
<td>Library Resources (subscriptions, services):</td>
<td>N/A</td>
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<tr>
<td>Transportation Requirements (budget, fees, fleet vehicles):</td>
<td>N/A</td>
</tr>
<tr>
<td>Forest Properties or Field Practicum Facilities:</td>
<td>N/A</td>
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</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:

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. Laboratory will consist of computer-based modelling exercises.
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 1</th>
<th>Name of Chair/Program Director</th>
<th>Chair Signature</th>
<th>Date</th>
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<tr>
<th>Department/Program 2</th>
<th>Name of Chair/Program Director</th>
<th>Chair Signature</th>
<th>Date</th>
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<table>
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<tr>
<th>Department/Program 3</th>
<th>Name of Chair/Program Director</th>
<th>Chair Signature</th>
<th>Date</th>
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[If more than three Departments/Programs, please continue on a separate page]

Other Units:

<table>
<thead>
<tr>
<th>Associate Provost for Instruction &amp; Dean of the Graduate School (for Gen Ed courses only)</th>
<th>Or letter attached</th>
<th>Date</th>
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<tr>
<th>Registrar</th>
<th>Or letter attached</th>
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<th>Library Director</th>
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<th>Computing and Network Services</th>
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<th>Forest Properties</th>
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<tr>
<th>Environmental Health and Safety</th>
<th>Or letter attached</th>
<th>Date</th>
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7. Proposer Information and Sponsoring Department Chair Affirmation:

Contact Person:
Name: Josh Drew                     Department: EFB
Email: jadrew@esf.edu               Phone: (315) 470-6789

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: ___________________________ Date: __________
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