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: 01/28/2020

1. Course Information:

1.1 Course Prefix and Number: ERE 520
   Course Title: Wastewater Resource Recovery
   (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 new course has previously been taught as an ERE 596 Special Topics course. It serves as one of the elective courses for the graduate programs in Ecological Engineering and Water Resource Engineering. It is also one of the engineering electives for the BS Program in Environmental Resources Engineering. It meets the following outcomes of the engineering programs: 1) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice; 2) an ability to design experiments, as well as to analyze and interpret data; and 3) an ability to apply knowledge of mathematics, science, and engineering.

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. Prerequisite: One of ERE 480 Fate and Transport of Contaminants (Fall); FCH 510 Environmental Chemistry I (Spring); and FCH515 Methods of Environmental Chemical Analysis (Fall). From one of these prerequisite courses, students are expected to have knowledge about the chemical processes (base-acid, oxidation-reduction, dissolution, precipitation, adsorption, distillation, etc.) in natural or engineered aquatic systems, reaction kinetics, and equilibrium as well as water quality characterization using such parameters as COD, BOD, TS, VS, TN, TP, TKN, orthoP, and alkalinity.

2.3 Explain the impact of this course in meeting the goals and outcomes of other Departments/programs (if any). None

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? A current faculty taught this course (ERE 596) in the past will continue to teach this course.

2.6 What Department (or extra-Department) resources are or will be made available to support the course or course revision? N/A

2.7 Anticipated Enrollment (enter where applicable)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Number</th>
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<tbody>
<tr>
<td>Fall Semester</td>
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<tr>
<td>Spring Semester</td>
<td>9</td>
</tr>
<tr>
<td>Summer Semester</td>
<td></td>
</tr>
</tbody>
</table>

2.8 Anticipated frequency of class meetings. Two hours of lecture/presentations/discussion per week
3. DETAILED COURSE DESCRIPTION

3.1 COURSE IDENTIFICATION AND FORMAT:

3.1.1 Course Prefix and Number: ERE 520
3.1.2 Course Name: Wastewater Resource Recovery
3.1.3 Credit Hours: 2
3.1.4 Semester (check all that apply): Fall ☐ Spring ☒ Summer ☐
3.1.5 Format (check as appropriate): Lecture ☒ Online ☐ Lab ☐ Field ☐
Other ☒ (explain) Student presentation and discussion
3.1.6 Contact hours per week: 2
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 of ERE 480 Fate and Transport of Contaminants; FCH 510 Environmental Chemistry I; and FCH515 Methods of Environmental Chemical Analysis

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 ☒
     If Yes, please explain:
  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. After completing this course the students should be able to:

1. Apply the principles of anaerobic digestion processes and nutrient transformations to design and analysis of wastewater resource recovery systems;
2. Design experiments to recover resources from wastewater and use laboratory results to assess resource recovery systems; and
3. Simulate and analyze the kinetics of anaerobic digestion and nutrient recovery processes using non-linear curve fitting with Excel Solver
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. 

Lecture Topics:

1. Solids analysis in liquid, solid and sludge samples

2. Carbon transformation in anaerobic digestion: Anaerobic digestion; alkalinity; chemical oxygen demand

3. Design and analysis of anaerobic digestion

4. Nitrogen and phosphorus transformations in anaerobic digestion: Nitrogen transformation; ammonia speciation; phosphorus speciation and transformation

5. Ammonia recovery

6. Phosphate recovery

3.5 INSTRUCTIONAL METHODS:

Identify the methods used to meet the course outcomes, as well as the principal instructional methods. Lecture on the technologies of wastewater resource recovery as well as the principles and applications of laboratory methods; explanation of laboratory manuals and demonstrations; presentation of experimental results by student groups; discussion of laboratory design, procedures, quality control, and data analysis

Evaluation will be based on participation in presentations and discussion following the presentations; assignments; and attendance of a safety training session and laboratory demonstrations.

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. ERE 520 Wastewater Resource Recovery (2)

Two hours of lecture, presentations and discussion per week. Introduction to technologies for recovery of bio-energy and nutrients from liquid wastes as well as the principles and applications of laboratory methods used in development and assessment of wastewater resource recovery processes. Presentation and discussion of experimental results for comprehensive analysis of anaerobic digesters. Spring.

Prerequisites: One of ERE 480; FCH 510; and FCH515.

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.

Staffing needs: It will be taught by current ERE faculty

Classroom resources (e.g. physical facilities in a laboratory, lecture hall, flexible space, academic computing):

Technology Resources: Multimedia computer cluster

Computing Resources (software licensing, hardware, access): Microsoft Office Suite

Library Resources (subscriptions, services): Moon Library already has a textbook

Transportation Requirements (budget, fees, fleet vehicles):

Forest Properties or Field Practicum Facilities:
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.
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:

Department/Program 1
______________________________
Name of Chair/Program Director
______________________________
Or letter attached □
Date

Chair Signature

Department/Program 2
______________________________
Name of Chair/Program Director
______________________________
Or letter attached □
Date

Chair Signature

Department/Program 3
______________________________
Name of Chair/Program Director
______________________________
Or letter attached □
Date

Chair Signature

[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
______________________________
Or letter attached □
Date

Library Director
______________________________
Or letter attached □
Date

Computing and Network Services
______________________________
Or letter attached □
Date

Physical Plant
______________________________
Or letter attached □
Date

Forest Properties
______________________________
Or letter attached □
Date

Environmental Health and Safety
______________________________
Or letter attached □
Date
7. Proposer Information and Sponsoring Department Chair Affirmation:

Contact Person:

Name: Wendong Tao ______________________________ Department: Environmental Resources Engineering ______________________________

Email: wtao@esf.edu ______________________________ Phone: (315) 470-4928 ______________________________

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: Lindi Quakenbush ______________________________

Date: ______

Department Chair (or designated curriculum representative)

Signature: __________________________________________ Or letter attached □

Department Chair (or designated curriculum representative)

8. Approvals:

___________________________________________________________ Date

Curriculum Committee

___________________________________________________________ Date

Faculty Governance

___________________________________________________________ Date

Provost