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: December 6, 2019

1. Course Information:

1.1 Course Prefix and Number: BPE 468
   Course Title: Capstone Chemical Engineering Laboratory
   (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.

If a new Capstone Laboratory course is developed for the senior Spring semester, this course can provide more advanced process engineering laboratory content in Bioprocess/Chemical Engineering programs. With a new course prerequisite, BPE 330, students already understand fundamental concepts and theories and are trained for basic unit operations and analytical techniques for this course. Therefore, this course will focus on experimental design, application of engineering units, and statistical analysis. The process operations laboratory will reinforce fundamental knowledge of the following courses: PSE 371 (Fluid Mechanics), BPE 335 (Transport Phenomena), BPE 422 (Chemical Reaction Engineering and Process Safety) and BPE 435 (Unit Process Operations) with application of BPE 330 (Unit Operations Laboratory). Therefore, students will practice the fundamental process operation concepts with practical engineering examples.

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. PSE 371, BPE 330, BPE 335, BPE 422, BPE 435. There are four components of the laboratory exercises in this course: Fluid Mechanics, Transport Phenomena, Reaction Engineering and Unit Operations Laboratory.

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.

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? TAs and currently existing staff.

2.6 What Department (or extra-Department) resources are or will be made available to support the course or course revision? Current laboratory space and equipment in the department will be used.

2.7 Anticipated Enrollment (enter where applicable)

<table>
<thead>
<tr>
<th>Fall Semester:</th>
<th>Spring Semester:</th>
<th>Summer Semester:</th>
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<tr>
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<td>40-50</td>
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</table>
2.8 Anticipated frequency of class meetings. 1.5 hour per week of lecture and 4.5 hours per week of lab.
3. DETAILED COURSE DESCRIPTION

3.1 COURSE IDENTIFICATION AND FORMAT:

3.1.1 Course Prefix and Number: BPE 468
3.1.2 Course Name: Capstone Chemical Engineering Laboratory
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: 1.5 lecture plus 4.5 hours lab
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) PSE 371, BPE 330, BPE 335, BPE 422, BPE 435

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: Bioprocess Engineering (Chemical Engineering)
    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: CEN 311 and CEN 412 in Chemical Engineering at SU, total of 4 credits or 8 hours of lab
    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. At the completion of this course, student will have the ability to

1. Identify, formulate, and solve engineering problems in chemical/biological processes by applying principles of chemical engineering.
2. Design appropriate processes and conduct/optimize the related experiments.
3. Critically analyze and discuss the results from the experiments.
4. Create and manage a project plan timely with appropriate updates and reports.
5. Make effective communication with other professionals by oral presentations and written documents.


7. Understand health and safety regulation in chemical/biological processes.

8. Work in an industrial-like team environment & perform in a leading position to accomplish the project goals.

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.

1. Reinforce fundamental concepts in bioprocess engineering like fluid mechanics, unit operations, transport phenomena, bioseparations, etc.

2. Reinforce knowledge of basic analytical and process engineering equipment.

3. Reinforce professional communications.

4. Reinforce laboratory and process safety principles.

5. Reinforce professional collaboration.

3.5 INSTRUCTIONAL METHODS:

Identify the methods used to meet the course outcomes, as well as the principal instructional methods. Instructor will provide lectures with slides on process design, statistical analysis, data interpretation, and fundamental knowledge of new equipment and analytical methods which were not covered in BPE 330. TAs supervise the laboratory experiments. Instructor provides guidance on the laboratory plan, experimental design and execution of experiments.

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.

BPE 463. Capstone Chemical Engineering Laboratory (3)

One and half hours of lecture and four and half hours of laboratory per week. Experimental design, data acquisition, and statistical analysis and interpretation of data. Professional communications with lab reports and presentations. The course is designed to help students acquire practical engineering knowledge in the areas of transport phenomena and unit operations.
by designing and performing experiments on material covered in earlier courses like PSE 371, BPE 330, BPE 335, BPE 422, and BPE 435.

3.7 COURSE HISTORY:

Provide the dates of prior approval of this course, and its revision history.
New course December 2019

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: Instructor, TA

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

Technology Resources:
Projector, black/white board

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

Library Resources (subscriptions, services):
No

Transportation Requirements (budget, fees, fleet vehicles):
No

Forest Properties or Field Practicum Facilities:
No
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:
Students in this course will encounter the following physical hazards either directly or indirectly from working in close proximity to other students in multiple use laboratories: moving mechanical parts, compressed gases and steam heated equipment. Students will encounter working on wet floors and the use of electrical devices (such as mixers and hot plates) in close proximity to wet floors and/or water faucets. Students will be required to wear safety eye glasses/goggles, hand protection and full-skin coverage clothing (no shorts or sandals). Students will be required to attend both a general safety lecture and a course specific safety lecture given by the course instructor. The course specific safety lecture will provide instructions on: available emergency safety equipment and where to find safe chemical handling information including appropriate personal protective equipment, as well as group travel in industrial facilities. Specific precautions will be given and warning signage pointed out to minimize risks associated while working: on equipment with moving parts (keep hands/feet away, do not wear loose clothing, secure long hair), near compressed gas cylinders (avoid close proximity as much as possible while cylinder is in use), with sharp cutting devices (use only for the intended purpose, cut in a direction away from you when possible), with equipment using steam heat (do not touch equipment, avoid close proximity as much as possible) and on wet floors and/or around water faucets with electrical devices (walk carefully and slowly, avoid simultaneous contact with wet surfaces and electrical devices). Appropriate personal protective equipment will be provided.
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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<tr>
<td>Department/Program 2</td>
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<tr>
<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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<thead>
<tr>
<th>Name of Unit</th>
<th>Date</th>
<th>Or letter attached</th>
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</thead>
<tbody>
<tr>
<td>Associate Provost for Instruction &amp; Dean of the Graduate School (for Gen Ed courses only)</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>Physical Plant</td>
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<td>Forest Properties</td>
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<td>Environmental Health and Safety</td>
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</table>
7. Proposer Information and Sponsoring Department Chair Affirmation:

Contact Person:
Name: Chang Geu Yoo _______________________________ Department: Paper and Bioprocess Engineering
Email: cyoo05@esf.edu _______________________________
Phone: 6516 ______________________________

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