1. Course Information:

1.1 Course Prefix and Number: PSE 678
   Course Title: Papermaking Processes II
   (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.

PSE 678 is part of a required two-course sequence that replaces the current PSE 668, which is a six-credit course in the Paper Engineering program. The revision of the old course into two courses allows greater flexibility in the scheduling of the course activities as well as easing the conflicts caused by the current extensive laboratory time in the spring semester. In addition, having the course over the full year will also allow for greater interaction amongst courses, especially with Fiber and Paper Properties (PSE 665) and Principles of Mass and Energy Balances (PSE 570).

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 570 (Principles of Mass and Energy Balances) [prerequisite] - This course provides the students with the tools necessary to do engineering calculations.

PSE 665 (Fiber and Paper Properties) [pre- or corequisite] - This course provides the students with knowledge of paper and fiber properties necessary for the production of paper.

PSE 662 (Papermaking Processes I) or permission of the instructor [prerequisite] - This course is the first course of the two course sequence.

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

The course can be taken as an elective in the Bioprocess Engineering and Renewable Materials Science programs as well as part of the Paper Science minor.

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?

The course will require TA support as well as assistance from the Director Pilot Operations and Instructional Support Technicians as it had in the past.

2.6 What Department (or extra-Department) resources are or will be made available to support the course or course revision?
The course is supported by the Pilot Plant in the form of equipment access and use. In addition, industrial sponsors provide materials for the course.

2.7 Anticipated Enrollment (enter where applicable)

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<th>Fall Semester:</th>
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<td>Summer Semester:</td>
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2.8 Anticipated frequency of class meetings. Labs, seminars, discussions - 2 times per week plus two day-long runs on the semi-commercial paper machine.
3. DETAILED COURSE DESCRIPTION

3.1 COURSE IDENTIFICATION AND FORMAT:

3.1.1 Course Prefix and Number: PSE 678
3.1.2 Course Name: Papermaking Processes II
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) seminars/discussions/two day-long runs on the semi-commercial paper machine
3.1.6 Contact hours per week: 6 hours laboratory/seminars/discussions
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 570, PSE 665, PSE 662 (or permission of the instructor)

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: MPS, MS, PhD Paper Science and Engineering option of the Paper and Bioprocess Engineering program
   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? PSE 478

3.3 STUDENT LEARNING OUTCOMES:

Identify the student learning outcomes associated with this course.

After completing this course the student should be able to:

1. design and conduct appropriate experiments and analyze the results to determine the necessary process conditions to meet various constraints such as the equipment available, raw material supplies, and the customers' needs.

2. scale-up production to a semi-commercial paper machine using the results from previous handsheet studies and pilot paper machine trials.
3. critically analyze, correlate, and discuss the results of the paper machine trials.

4. create and manage a project plan and provide appropriate updates and reports.

5. create well-written reports and effectively present results orally in meetings and seminars.

6. work in an industrial-like team environment to accomplish the course’s goals.

7. critically evaluate the performance of classmates and coworkers.

8. understand and follow the health and safety considerations in the pulp, paper, and chemical industry.

9. independently design, develop and execute a research project and generate a well-developed written report and oral presentation of the results.

### 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.

The course consists of discussions, exams, student seminars, laboratory work, homework, evaluations, and runs on the pilot and semi-commercial paper machines. PSE 678 is an open-ended course where the students are responsible for creating and implementing the project plan to create a number of different grades of paper on the two paper machines in the pilot plant. The paper grades must be made to the specifications of their customers who can include both intradepartmental and extradepartmental clients.

The students work as a team to design, plan, and implement the production of several grades of paper on the pilot equipment in Walters Hall. During the first course in the sequence, the students take the project up through the pilot pilot paper machine; the larger runs on the semi-commercial machine are done during the subsequent course (PSE 678). The students are responsible for planning and organizing their work during the semester under the guidance of the instructor, Director of Pilot Operations, Instructional Support Technicians, and Teaching Assistant. During the project, the students are expected to organize into teams to handle specific tasks, progress on which is reported out at weekly meetings. The group must collect data and samples during the paper machine run, process this information, produce a material and energy balance on the machines, evaluate the produced paper grades, and present the gathered and analyzed data to the class in a seminar-type discussion. During the course of the semester, various reports are produced to track the project accomplishments.

The following topics are covered during this course (and the previous course):

1. Project management
2. Paper specifications
3. Papermaking raw materials
4. Stock preparation
5. Wet end operations
6. Pressing
7. Drying
8. On-machine finishing
9. Paper machine clothing
10. Chemical additives
11. Steam systems

3.5 INSTRUCTIONAL METHODS:

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

Six hours of laboratory/seminars/discussions per week.

A number of different instructional methods are used during the course, including:
1. Guided discussions
2. Guest expert speakers
3. Student-directed meetings and seminars
4. Homework exercises
5. Laboratory and pilot scale work
6. Group problem solving

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.

Six hours of laboratory/discussions/seminars per week. Semi-commercial study of papermaking processes, continuing the work of PSE 662. Emphasis on the scale-up of paper machine operations based on previous laboratory and pilot scale results, and engineering analysis of the stock and paper machine systems through detailed mass and energy balances. Results are presented in written reports and student seminars. Spring.

Prerequisites: PSE 570, PSE 665, PSE 662 (or permission of the instructor)

3.7 COURSE HISTORY:

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

This course was approved by the C of F Faculty 5/28/68. It was one of the new courses to be offered in the Paper Science and Engineering Curriculum Revision of that date and was first offered in the Spring Semester, 1969-70. PSE 568 was originally proposed under the number PSE 168, but was renumbered PSE 568 by the Faculty Action of 5/7/68. PSE 568 was renumbered PSE 468 by the Faculty Action 12/19/73, which approved the renumbering of many 500-level courses to conform to SUNY standards. Course revised by Faculty Action of 3/26/81. Course revised 2/18/2011. Course revised 3/1/2019.

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: 1 Instructor, 1 TA, assistance from pilot plant staff in running equipment

Classroom resources (e.g. physical facilities in a laboratory, lecture hall, flexible space, academic computing): Lecture room, Various laboratories in Walters Hall

Technology Resources: Ability to present electronically

Computing Resources (software licensing, hardware, access): Word, Excel, Powerpoint, Matlab with Simulink

Library Resources (subscriptions, services): Paperchem and Paperbase databases, current library collection

Transportation Requirements (budget, fees, fleet vehicles): N/A

Forest Properties or Field Practicum Facilities: N/A
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 use hazardous chemicals, including but not limited to: corrosives (various acids and sodium hydroxide) and reactive/toxic chemicals (potassium permanganate, iodine solutions and some dyes). Students 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, utility razor blades for cutting paper testing samples, 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, hearing protection, 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. 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.N/A
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:

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<th>Department/Program 1</th>
<th>Name of Chair/Program Director</th>
<th>Chair Signature</th>
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(if more than three Departments/Programs, please continue on a separate page)

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Associate Provost for Instruction & Dean of the Graduate School (for Gen Ed courses only) | Date |
|                                                                                       |      |

Registrar | Date |
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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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7. Proposer Information and Sponsoring Department Chair Affirmation:

Contact Person:
Name: Gary M Scott __________________________
Department: PBE __________________________
Email: gscott@esf.edu _______________________
Phone: x6523 _____________________________

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: Bandaru V. Ramarao __________________________________________
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