Proposal Form For Addition And Revision Of Courses

1. Proposing College / School: Engineering
   Department: Polymer and Fiber Engineering

2. Course Prefix and Number: PFEN5300/6300

3. Effective Term: Spring 2012

4. Course Title: Advanced Methods in Polymer Characterizations
   Abbreviated Title (30 characters or less):

5. Requested Action:
   - [ ] Renumber a Course
   - [ ] Add a Course
   - [ ] Revise a Course

6. Course Credit:
<table>
<thead>
<tr>
<th>Contact/Group Hours</th>
<th>Scheduled Type</th>
<th>Weekly or Per Term</th>
<th>Credit Hours</th>
<th>Anticipated Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>weekly</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Maximum Hours</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
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<tr>
<td>(Repeatability):</td>
<td></td>
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7. Grading Type:
   - [ ] Regular (ABCDF)
   - [ ] Satisfactory/Unsatisfactory (S/U)
   - [ ] Audit

8. Prerequisites/Corequisites:
   PHYS 1610, PFEN 3500 or departmental approval

9. Restrictions: List specific restriction in space above.

10. Course Description:
    (20 Words or Less: exactly as it should appear in the Bulletin)

11. May Count Either: Program Type or Program Title
    (Indicate if this particular course cannot be counted for credit in addition to another)

12. Affected Program(s):
    (Respond “N/A” if not included in any program; attach memorandum if more space is required)

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Program Title</th>
<th>Requirement or Elective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Bachelor in PFEN</td>
<td>required</td>
</tr>
<tr>
<td>Major</td>
<td>MS, PhD in PFEN</td>
<td>required</td>
</tr>
</tbody>
</table>

13. Overlapping or Duplication of Other Units’ Offerings:
    (If course is included in any other degree program, is used as an elective frequently by other unit(s), or is in an area similar to that covered by another college/school, attach correspondence with relevant unit)
   - [ ] Applicable
   - [ ] Not Applicable
14. Justification: This proposal is to consolidate PFEN 4100 and PFEN 7700 classes to piggyback classes, with the focus in polymer characterization theories and techniques. The consolidation will help to promote the efficiency of teaching and lab sections. The undergraduate section and graduate section will be evaluated separately.

(Include a concise, yet adequate rationale for the addition/revision of the course, citing accreditation, assessments (faculty, graduate, and/or external) where applicable)

15. Resources: Not applicable

(Indicate whether existing resources such as library materials, classroom/laboratory space, and faculty appointments are adequate to support the proposed addition/revision; if additional resources are required, indicate how such needs will be met, referencing the appropriate level of authorization -- i.e.: Dean -- where necessary; if no additional resources or shifting of resources will be necessary, respond “Not Applicable”)

16. Student Learning Outcomes: Upon the completion of this course, the students are expected to (i) get familiar with the common methods used in the analytical characterization of polymers; (ii) understand the fundamental physics and chemistry used by these techniques, and (iii) be able to select the appropriate method of characterization to solve a given problem.

(State in measurable terms (reflective of course level) what students should be able to do when they have completed this course)

17. Course Content Outline:
Week 1: Introduction to polymer Characterization: purpose of characterization, molecular architecture, survey of techniques.
Week 2: Molecular weight determination: primary methods, secondary methods.
Week 3: Introduction to spectroscopy: energy level calculations, properties of electromagnetic radiation, double beam optics.
Week 4: UV-Visible spectroscopy: instrumentation, theoretical estimation of electronic levels, polymer applications.
Week 5: Vibrational spectroscopy: infrared (FTIR) and Raman spectroscopy—fundamentals, experimental techniques, application to polymers.
Week 6: Nuclear magnetic resonance spectroscopy (NMR): principles of magnetic resonance, experimental techniques, applications to polymers.
Week 7: Electron spin resonance spectroscopy: theory, experimental considerations, polymerization studies, degradation, relaxation.
Week 8: X-ray diffraction: generation and properties of X-rays, diffraction theory, wide- and small-angle scattering, applications to polymers.
Week 9: Scanning electron microscopy: introduction, design and operation of the SEM, primary, secondary, and backscattered electrons, contrast, observation of polymers, artifacts.
Week 10: Transmission electron microscopy: diffraction, layout of the TEM, diffraction, resolution, contrast, polymer studies, scanning transmission electron microscopy.
Week 11: Light optical techniques: refractive indices, birefringence, small angle light scattering.
Week 12: Thermal analysis: calorimetry, thermomechanical analysis, thermogravimetric analysis.
Week 13: Thermal analysis: dynamic mechanical analysis, dielectric thermal analysis, rheology.
Week 14: Other techniques: x-ray photoelectron scattering, electron spectroscopy for chemical analysis, neutron diffraction.

(Provide a comprehensive, week-by-week breakdown of course content, including assignment due dates)

18. Assignments / Projects: The grade for this course will be determined by the results of 2 written examinations and written laboratory reports. The weighting will be as follows: Mid-term Exam 25%, Final Exam 25%, Lab reports 30%, Final report 20%.

(List all quizzes, projects, reports, activities and other components of the course grade -- including a brief description of each assignment that clarifies its contribution to the course’s learning objectives)
19. Rubric and Grading Scale: Minimum grades will be assigned as follows (T=% of total points):
T is equal to or more than 90%; A; T is between 80%~99%; B; T is between 70%~79%; C; T is between 60%~69%; D; T is less than 60%; F

(List all components of the course grade -- including attendance and/or participation if relevant -- with point totals for each; indicate point totals and ranges or percentages for grading scale; for S/U grading, detail performance expectations for a passing grade)

20. Justification for Graduate Credit: This course will be part of the PFEN curricula and presents a supporting course that will be offered to graduate students in order to complete the thesis research and to meet the PFEN student's career goals.

(Include a brief statement explaining how the course meets graduate educational standards (i.e.: rigorous standards for evaluation, development of critical thinking and analytical skills, etc.))

(Included below are standard statements regarding course policies. If necessary, a statement may be altered to reflect the academic policies of individual faculty members and/or the academic unit or department, provided that there is no conflict with the Tiger Cub, Faculty Handbook, or any existing university policy.)

POLICY STATEMENTS

Attendance: Although attendance is not required, students are expected to attend all classes, and will be held responsible for any content covered in the event of an absence.

Excused Absences: Students are granted excused absences from class for the following reasons: illness of the student or serious illness of a member of the student's immediate family, the death of a member of the student's immediate family, trips for student organizations sponsored by an academic unit, trips for university classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance, and religious holidays. Students who wish to have an excused absence from class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request, and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required. Please see the Tiger Cub for more information on excused absences.

Make-Up Policy: Arrangement to make up a missed major examination (e.g., hour exams, mid-term exams) due to properly authorized excused absences must be initiated by the student within one week of the end of the period of the excused absence(s). Except in unusual circumstances, such as the continued absence of the student or the advent of university holidays, a make-up exam will take place within two weeks of the date that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins.

Academic Honesty Policy: All portions of the Auburn University student academic honesty code (Title XII) found in the Tiger Cub will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Disability Accommodations: Students who need special accommodations in class, as provided for by the Americans With Disabilities Act, should arrange for a confidential meeting with the instructor during office hours in the first week of classes (or as soon as possible if accommodations are needed immediately). The student must bring a copy of their Accommodation Letter and an Instructor Verification Form to the meeting. If the student does not have these forms, they should make an appointment with the Program for Students with Disabilities, 1288 Haley Center, 844-2096 (V/TT).