Proposal Form For Addition And Revision Of Courses

1. Proposing College / School: Engineering
   Department: Industrial & Systems Engineering

2. Course Prefix and Number: INSY 3410
   3. Effective Term: Fall 2013

4. Course Title: Deterministic Operations Research
   Abbreviated Title (30 characters or less): Deterministic OR

5. Requested Action:
   - [ ] Renumber a Course
   - [ ] Add a Course
   - [ ] Revise a Course
   Current Course Number:
   Proposed Course Number:
   Type of Revision: Remove Lab

6. Course Credit:

<table>
<thead>
<tr>
<th>Contact/Group Hours</th>
<th>Scheduled Type (e.g.: Lab, Lecture, Practicum, Directed Study)</th>
<th>Weekly or Per Term?</th>
<th>Credit Hours</th>
<th>Anticipated Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Hours (Repeatability): 3</td>
<td>Lecture</td>
<td>weekly</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

   Total Credit Hours: 3

7. Grading Type:
   - [ ] Regular (ABCDF)
   - [ ] Satisfactory/Unsatisfactory (S/U)
   - [ ] Audit

8. Prerequisites/Corequisites:
   Use "P:*" to indicate a prerequisite, "C:*" to indicate a corequisite, and "P/C:*" to indicate a prerequisite with concurrency.
   (P) ENGR 1110 - Introduction to Engineering;
   (P) MATH 2660 - Topics in Linear Algebra.

9. Restrictions: List specific restriction in space above.
   - [ ] College
   - [ ] Major
   - [ ] Standing
   - [ ] Degree

10. Course Description:
    (20 Words or Less; exactly as it should appear in the Bulletin)
    Formulation, solution, interpretation, and implementation of mathematical models in operations research including linear programming, integer programming and network flows.

11. May Count Either:
    - [ ] Program Type
    - [ ] Program Title
    - [ ] Requirement or Elective?

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>B.S., Industrial &amp; Systems Engineering</td>
<td>Required</td>
</tr>
<tr>
<td>Major</td>
<td>B.S., Wireless - Electrical and Software Engineering</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:

INSY 3410 is currently a 3-hour class consisting of 2-hours of lecture time and a lab period. The proposal is to replace the lab, making the class 3-hours of lecture time.

This requested change is motivated by two primary drivers, including increased applicability of deterministic operations research techniques in industry and significant improvements in student computer skills. As for the first point, there is a growing need to expose students to more material, and to cover this material at a deeper level. Specifically, with three lecture hours per week, the module on "network flows" (including shortest path, transportation, transshipment, and minimum spanning tree problem), may be expanded to cover specialized solution approaches and additional applications. With an increased focus on logistics and supply chain problems in industry, additional class time devoted to network problems will help to prepare our students for future employment. This enhanced treatment of network problems is especially beneficial to the Wireless Engineering students who take this class as part of their degree requirements. The extra hour of lecture per week also permits increased coverage of integer programming and would enable time for an overview of nonlinear programming concepts (which are currently omitted from the course). These mathematical optimization approaches have wide applications to scheduling, product pricing, and inventory management decisions.

In terms of computing technology, while the lab for this course was previously necessary to provide students access to complicated and expensive software, these barriers no longer exist. For example, modern operations research software is now user friendly and intuitive for our students who have become increasingly tech-savvy. Furthermore, the course textbook now contains a very thorough treatment of the relevant software, including tutorials, sample code, and case studies. Finally, powerful software for deterministic operations research, which was once restricted by expensive site licenses, is now freely available for students to run on their personal computers. Thus, there is no longer a requirement for students to be tethered to campus computer terminals to utilize this software. Given the increased accessibility to relevant software, it is now possible for students to practice utilizing these software packages via homework assignments rather than during limited lab sessions.

The requested additional lecture time will enable students to gain a deeper understanding of more relevant material by leveraging improvements in operations research software and improved student computer skills.

(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:

Classroom space is needed to accommodate 100+ students for 3 lecture hours per week. Currently, this class meets in Shelby 1103 from 2:00 - 2:50pm on Wednesdays and Fridays.

(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:

Formulate linear programming problems;
Solve linear programming problems using the simplex method and revised simplex method;
Conduct sensitivity analysis of linear programming solutions and interpret results;
Identify and formulate transportation, transshipment, and assignment problems;
Formulate integer programming problems;
Apply the branch-and-bound procedure to solve integer programs;
Formulate nonlinear programming problems;
Solve unconstrained and constrained nonlinear programming problems;

(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: see attached

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

18. Assignments / Projects: see attached

(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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Class Quizzes (12 quizzes, approximately 1 per week)</td>
<td>10%</td>
</tr>
<tr>
<td>Exam 1 (Modeling LPs, Simplex Method, Big M Method)</td>
<td>30%</td>
</tr>
<tr>
<td>Exam 2 (Revised Simplex, Sensitivity Analysis, Transportation Problems, and Network Problems)</td>
<td>30%</td>
</tr>
<tr>
<td>Exam 3 (Integer and Nonlinear Programming)</td>
<td>30%</td>
</tr>
<tr>
<td>Student’s Final Average, Grade</td>
<td></td>
</tr>
<tr>
<td>≥ 90%, A (superior)</td>
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<tr>
<td>≥ 80%, B (good)</td>
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<tr>
<td>≥ 70%, C (acceptable)</td>
<td></td>
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<tr>
<td>≥ 60%, D (passing)</td>
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<tr>
<td>&lt; 60%, F (failure)</td>
<td></td>
</tr>
</tbody>
</table>

(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: N/A (undergraduate course only)

(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 Student Policy eHandbook, 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 consult the Student Policy eHandbook 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 Student Policy eHandbook 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 accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).
Approvals

Department Chair / Head

Date

College / School Curriculum Committee

Date

College / School Dean

Date

Dean of the Graduate School (for Graduate Courses)

Date

Assoc. Provost for Undergraduate Studies (for Undergraduate Courses)

Date

Contact Person: ___________________________ Telephone: ___________________________

E-Mail Address: ___________________________ Fax: ___________________________