**PURDUE UNIVERSITY**

REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF A GRADUATE COURSE
(500-600 LEVEL)

**DEPARTMENT:** Engineering  
**EFFECTIVE SESSION:** Spring 2012

**INSTRUCTIONS:** Please check the items below which describe the purpose of this request.

- [X] New course with supporting documents (complete proposal form)
- [ ] Add existing course offered at another campus
- [ ] Expiration of a course
- [ ] Change in course number
- [ ] Change in course title
- [ ] Change in course/credit type
- [ ] 7. Change in course attributes
- [ ] 8. Change in Instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisite
- [ ] 11. Change in semesters offered
- [ ] 12. Transfer from one department to another

**PROPOSED:**
- Subject Abbreviation: Interdisciplinary Engineering (ENGR)
- Course Number: ENGR 595
- Long Title: Selected Topics in Engineering
- Short Title: Eng. Special Topics

**EXISTING:**
- Subject Abbreviation: ENGR

**TERMS OFFERED:**
- Check all that apply: [X] Summer  [ ] Fall  [X] Spring

**CAMPUS(ES) INVOLVED:**
- Check all that apply:
  - [ ] Calumet
  - [ ] Fort Wayne
  - [X] Indianapolis
  - [ ] N. Central
  - [ ] Tech Statewide
  - [ ] W. Lafayette

**CREDITS TYPE:**
- 1. Fixed Credit: Cr. Hrs.
- 2. Variable Credit Range: Minimum Credit Hrs.☐ 1 Cr.  ☐ 2 Cr.  ☐ 3 Cr.  ☐ 4 Cr.  ☐ 5 Cr.
- 3. Equivalent Credit: ☐ Yes ☐ No
- 4. Thesis Credit: ☐ Yes ☐ No

**COURSE ATTRIBUTES:** Check All That Apply
- ☐ Registration Approval
- ☐ Department
- ☐ Variable Title
- ☐ Remedial
- ☐ Honors
- ☐ Full Time Privilege
- ☐ Off Campus Experience

**INSTRUCTIONAL TYPE:**
- Lecture: TBD
- Recitation: TBD
- Presentation: TBD
- Laboratory: TBD
- Lab Prep: TBD
- Studio: TBD
- Distance: TBD
- Clinic: TBD
- Experiential: TBD
- Research: TBD
- Ind. Study: TBD
- Pract/Observe: TBD

**MEETINGS PER WEEK:**
- TBD

**WEEKS OFFERED:**
- TBD (Asyn. Or. Syn.)
- Live
- TBD

**DELIVERY METHOD:**
- TBD

**COURSE DESCRIPTION (INCLUDE REQUISITES):**
This course number serves as a means to offer one-time, interdisciplinary specialty topics in engineering such as engineering optimization, design innovation, engineering management, and infrared radiometry (an interdisciplinary topic that is relevant to a local employer). It will also be used as a vehicle for the Engineering Department to develop new interdisciplinary engineering curriculum offerings.

**SIGNATURES:**
- Calumet Department Head: [Signature] 12/15/11
- Fort Wayne Department Head: [Signature] 12/15/11
- Indianapolis Department Head: [Signature] 12/15/11
- North Central Department Head: [Signature] 12/15/11
- West Lafayette Department Head: [Signature] 12/15/11
- Graduate Area Committee Convener: [Signature] 12/15/11

**OFFICE OF THE REGISTRAR**
Supporting Document for a New Graduate Course

To: Purdue University Graduate Council
From: Faculty Member: Dr. Steve Walter
      Department: Engineering
      Campus: Fort Wayne
Date: November 8, 2011
Subject: Proposal for New Graduate Course-Documentation Required by the Graduate Council to Accompany Registrar's Form 40G

Contact for information if questions arise:
Name: Dr. Carlos Pomalaiza-Raez
      Phone Number: (260) 481-6353
      E-mail: carlos-pomalaiza-raez@purdue.edu
      Campus Address: ETCS ET 243D

Course Subject Abbreviation and Number: ENGR 59500
Course Title: Selected Topics in Engineering
Proposed Course Number: ENGR 595
Proposed Course Title: Selected Topics in Engineering
Credits: 1 to 3 Credits

A. Justification for the Course:
Explain how this course relates to other courses offered in this department or other departments and how this course fulfills a recognized need.

This course is intended primarily for students:
X from within this department or □ from other departments

This course number serves as a means to offer one-time, interdisciplinary specialty topics in engineering such as engineering optimization, design innovation, engineering management, and infrared radiometry (an interdisciplinary topic that is relevant to a local employer). It will also be used as a vehicle for the Engineering Department to develop new interdisciplinary engineering curriculum offerings.

An example of a course would be a class in engineering optimization. The justification for this course would be:


This course is interdisciplinary because it would benefit anyone who uses or will use scientific computing or optimization in engineering or related work (e.g., systems engineering, machine learning, finance). More specifically, people from the following fields: Electrical Engineering (especially areas like signal and image processing, communications, control, EDA & CAD); Aero & Astro (control, navigation, design), Mechanical & Civil Engineering (especially robotics, control, structural analysis, thermal systems, design); Computer Science (especially machine learning, robotics, computer graphics, algorithms & complexity, computational geometry); Operation Research; Scientific Computing and Computational Mathematics.

B. Level of the Course:
Justify request for graduate course level by indicating anticipated enrollments of undergraduate and graduate students.

The student enrollment will be determined by both the course content and necessary prerequisites. With that caveat, ENGR595 courses are expected to nominally enroll:
Anticipated Percentage of Undergraduate Student Enrollment: 10%
Anticipated Percentage of Graduate Student Enrollment: 90%

C. Prerequisites: (If none, please explain reasons for absence)
ENGR courses typically require graduate standing in the engineering program but may have other prerequisites depending on the course. The example course in optimization would clearly require an undergraduate curriculum that includes both a two or three-semester calculus sequence
as well as a course in differential equations.

D. Course Instructor(s): Members of the graduate faculty in the IPFW Department of Engineering. Details on the department faculty can be found at: http://new.ipfw.edu/departments/etcs/depts/engr/faculty/

E1. Course Outline:
An outline of topics to be covered and an indication of the relative emphasis or time devoted to each topic is necessary. If laboratory or field experience is involved, the nature of this component should be explained as well.

The outline will depend on course specifics. A course in engineering optimization would require weekly classes that are 2.5 hours long. A possible of outline is as follows:

<table>
<thead>
<tr>
<th>Day</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Convex sets</td>
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<tr>
<td>2</td>
<td>Convex functions</td>
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<tr>
<td>3</td>
<td>Convex optimization problems</td>
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<td>4</td>
<td>Duality</td>
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<td>5</td>
<td>Approximation and fitting</td>
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<td>6</td>
<td>Statistical estimation</td>
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<td>7</td>
<td>Geometric problems</td>
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<td>8</td>
<td>Numerical linear algebra background</td>
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<td>9</td>
<td>Unconstrained minimization</td>
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<tr>
<td>10</td>
<td>Equality constrained minimization</td>
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<td>11</td>
<td>Interior-point methods</td>
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<td>12</td>
<td>Stochastic programming</td>
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<tr>
<td>13</td>
<td>Convex optimization examples</td>
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<tr>
<td>14</td>
<td>Exams</td>
</tr>
<tr>
<td>15</td>
<td>Convex sets</td>
</tr>
</tbody>
</table>

E2. Method of Evaluation or Assessment:
The method of evaluation will be a combination of homework, exams and/or projects. The actual mix will depend on the course specifics.

For the example optimization course:
- Homework (20%)
- Project (20%)
- Two Exams: (60%)

E3. Course Outcomes

To be determined by the course specifics.

Example: A student who successfully completes the optimization course will have demonstrated:
- To give students the tools and training to recognize convex optimization problems
that arise in engineering

- To present the basic theory of such problems, concentrating on results that are useful in computation
- To give students a thorough understanding of how such problems are solved, and some experience in solving them
- To give students the background required to use the methods in their own research or engineering work

F. Reading List:
A reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.

To be determined by the course specifics. For the example engineering optimization course:
