Course Description (Include Requisites/Restrictions):

C: CE 487, ECE 405, ENGR 410, ME 487 or Graduate Standing

Planning, analysis, and design of manufacturing processes in the context of a manufacturing system that meets customer quality, cost and delivery requirements; an integrated project will cover major aspects of manufacturing systems engineering and process design. Emphasis will be placed on the design of manufacturing processes (including assembly systems) in terms of physics and design parameters to meet system cost, quality, product variety and delivery objectives. When to use lean and six-sigma techniques in the context of the manufacturing enterprise design will be evaluated analytically and through computer simulation and physical modeling.
Supporting Document
to accompany the Registrar’s FORM 40G when:

1. Requesting a New Graduate Course (Complete Section I)
or
2. Adding Distance as an Additional Schedule Type (Complete Section II)

To: Purdue University Graduate Council

From: Faculty Member: ____________________________
Department: Engineering
Campus: Fort Wayne

Date: November 6, 2013

Subject: Supporting Document to the Registrar’s Form 40G

For Reviewer’s comments only
(Select One)

Reviewer:

Comments:

Contact for information if questions arise:

Name: David Cochran, Ph.D.

Phone Number: 260-481-0341

E-mail: cochrand@ipfw.edu

Campus Address: 2101 E. Coliseum Blvd ET 229B, Fort Wayne, IN

Course Subject Abbreviation and Number: SE 55000

Course Title: Advanced Manufacturing Systems and Processes

SECTION I

A. Justification for the Course:

• Provide a complete and detailed explanation of the need for the course (e. g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.

The course is proposed to be part of the Systems Engineering (SE) concentration in the MSE program at IPFW. The mission of the SE concentration is to support the defense and manufacturing industry in the region with respect to how to design manufacturing systems that use advanced manufacturing processes and manufacturing system engineering disciplines to design, launch and sustain manufacturing industries and businesses. No other graduate course of this kind is offered by the department.

• Justify the level of the proposed graduate course (50000- or 60000-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

The target audience is for SE Masters students and for engineering seniors, corequisite with the engineering senior project classes. Anticipated number is 15 students per class. The course will be very rigorous by evaluating theoretical knowledge through exams and homework and in terms of the students’ ability to apply theory through an industry-applicable course project.
B. Learning Outcomes and Method of Evaluation or Assessment:

- Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.).

  Course objective: To develop capabilities of students to solve real-life manufacturing systems and process engineering problems through design, analysis and modeling.

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)

  Evaluation criteria are 5 Homework Problem Sets, Mid-Term Exam, Final Exam and Course Project and Presentation. The project write-up and presentation will consist of 40% of the course grade; the final exam is 25%, homework is 20% and the mid-term exam is 15%.

- Grading criteria (select from drop down boxes); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

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<th>Criteria</th>
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<th>Criteria</th>
<th>Papers and Projects</th>
<th>Criteria</th>
<th>Homework</th>
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</thead>
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- Identify the method(s) of instruction (select from drop down box) and describe how the methods promote the likely success of the desired student learning outcomes.

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<th>Method of Instruction</th>
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<th>Presentation</th>
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C. Prerequisite(s):

- List prerequisite courses by subject abbreviation, number, and title.

  Prerequisite: Graduate Standing - requires admission to the graduate program
  Corequisite: CE 48700, or ECE 40500, or ENGR 41000, or ME 48700 - Senior in Engineering Design Project - Part 1

- List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence.

  The purpose of the engineering corequisite is that it ensures that the engineers have taken all of the necessary courses to do the senior design project in engineering. If the those courses have not been completed, a student may not be admitted to the proposed SE550 course.

D. Course Instructor(s):

- Provide the name, rank, and department/program affiliation of the instructor(s).

  David S. Cochran, Associate Professor of Systems Engineering and Director of the IPFW Center of Excellence in System Engineering

- Is the instructor currently a member of the Graduate Faculty?  
  
  X Yes — No
  (If the answer is no, indicate when it is expected that a request will be submitted.)
E. Course Outline:
   • Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course.

   1. Introduction, course-learning objectives, history of manufacturing, the unit cost equation
   2. System design to achieve customer requirements (i.e., quality, cost, delivery)
   3. Determining system boundary, requirements and mfg. in SE Life Cycle (rapid prototyping illustration)
   4. System design and value stream mapping to achieve system functional requirements
   5. Manufacturing system physical modeling and simulation
   6. Design of robust systems to achieve predictable output in spite of variation
   7. Design of controllable systems to minimize variation
   8. System design to reduce time in system (i.e., the 5 Delays)
   9. Design of product and volume-flexible cells; design of single-piece flow cells to produce at the pace of

F. Reading List (including course text):
   • A primary 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.

   Required Text:

   Excerpts from selected books, and articles, including but not limited to:


G. Library Resources
   • Describe the library resources that are currently available or the resources needed to support this proposed course.

   IPFW Library System.

H. Example of a Course Syllabus (While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the Graduate School's Policies and Procedures Manual for Administering Graduate Student Programs. See Appendix K.)


(Revised and Approved by the Graduate Council 2/13)