TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Industrial Engineering

RE: Change to Graduate-Level Course IE 67400 Title and Description

The Faculty of the School of Industrial Engineering has approved the following prerequisite and course description changes.

From: IE 67400 – Computer and Communication Methods for Production Control
Term Offered: Spring, Lecture 3, Cr. 3

Prerequisites: IE 57400 or IE 57500 or IE 57900;
Description: The study of the theoretical foundation and relevance of advanced computer and communication methods in the planning and control of intelligent production operations; manufacturing operating systems; synchronization in decentralized systems; recovery in decentralized systems; parallel processing; distributed databases; factory networks; reasoning and logic for production control.

To: IE 67400 – Cyber Methods for Advanced Production Control
Term Offered: Spring, Lecture 3, Cr. 3

Prerequisites: IE 57400 or IE 57500 or IE 57900;
Description: The study of the theoretical foundation and relevance of advanced cyber methods in the planning and control of intelligent production operations; manufacturing operating systems; synchronization in decentralized systems; recovery in decentralized systems; parallel processing; distributed databases; factory networks; reasoning and logic for production control.

Reason: The course contents has been updated to include research on methods of computing, communication, real-time control, and brain models, all comprising what cyber is, with a focus on th production control context.

Abhijit Deshmukh
Professor and Head
School of Industrial Engineering
**PURDUE UNIVERSITY**

**REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE**

*(50000-60000 LEVEL)*

**DEPARTMENT:** Industrial Engineering  
**EFFECTIVE SESSION:** Spring 2017

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

- [ ] 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
- [ ] Change in course attributes
- [ ] Change in instructional hours
- [ ] Change in course description
- [ ] Change in course requisites
- [ ] Change in semesters offered
- [ ] Transfer from one department to another

**PROPOSED:**

- **Subject Abbreviation:** IE
- **Course Number:** 67400
- **Long Title:** Cyber Methods for Advanced Production Control
- **Short Title:** Cyber Methods Adv Prod Control

**EXISTING:**

- **Subject Abbreviation:** IE
- **Course Number:** 67400

**TERMS OFFERED:**

- [ ] Check All That Apply
- [ ] Fall
- [ ] Spring
- [ ] Summer
- [ ] Calumet
- [ ] Cont Ed
- [ ] Ft. Wayne
- [ ] Indianapolis
- [ ] N. Central
- [ ] Tech Statewide
- [ ] W. Lafayette

**CAMPUS(ES) INVOLVED:**

- [ ] Calumet
- [ ] Cont Ed
- [ ] Ft. Wayne
- [ ] Indianapolis
- [ ] N. Central
- [ ] Tech Statewide
- [ ] W. Lafayette

**COURSE ATTRIBUTES:**

- [ ] Pass/Not Pass Only
- [ ] Satisfactory/Unsatisfactory Only
- [ ] Repeatable
- [ ] Maximum Repeatability Credit: [ ] No [ ] Yes
- [ ] Registration Approval
- [ ] Instructor
- [ ] Department
- [ ] Variable Title
- [ ] Honors
- [ ] Credit by Examination
- [ ] Full Time Privilege
- [ ] Off-Campus Experience
- [ ] Fees [ ] Crop [ ] Lab [ ] Rate Request

**COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):**

(Note: If description will not fit in space provided, please create a separate document and attach it to this form.)

The study of the theoretical foundation and relevance of advanced cyber methods in the planning and control of intelligent production operations, manufacturing operating systems, synchronization in decentralized systems, recovery in decentralized systems, parallel processing, distributed databases, factory networks, reasoning and logic for production control. Prerequisites: IE 57400 or IE 57500 or IE 57900.

**COURSE LEARNING OUTCOMES:** (Note: If course learning outcomes will not fit in space provided, please create a separate document and attach it to this form.)

Be able to... 1. identify and use e-Collaborative algorithms and protocols; 2. understand and differentiate between the top five levels of automation; 3. apply cyber methods to various production control scenarios;

**Schedule Type:**

- **Minutes Per Mtg:**
  - Lecture: 50
  - Recitation: 3
  - Presentation: 1
  - Laboratory: 1
  - Lab Prep: 1
  - Studio: 1
  - Distance: 1
  - Clinic: 1
  - Experiential: 1
  - Research: 1
  - Ind. Study: 1
  - Pract/Observer: 1

- **Weeks Offered:**
  - 1b
  - 100

- **% of Credit Allocated:**
  - Cross-Listed Courses

Date: 11/13/14

**OFFICE OF THE REGISTRAR**

Grad Form 40G must include the Graduate Council’s supporting document, which is available at http://www.purdue.edu/registrar/forms/form_40_intro.html
IE 674 Cyber Methods for Production Control

M, W, F, 3:30 - 4:20 PM GRIS 134

Instructor: Professor S.Y. Nof  nof@purdue.edu

Prerequisite: Graduate student, background in computing, programming not required

Reading: Required reading list and handouts – Posted on BB

Course Objectives -- What we will learn:

- The theoretical foundation and relevance of advanced cyber, real-time control, computing, communication, and brain models for (1) robotics and (2) automation of planning and decisions in distributed production and supply installations, global supply, logistics, and service systems/networks.

- Current and emerging functions, algorithms, protocols, and models; how to apply them in research projects and presentations, and in the field. Focus will be on the five top levels of automation (Nof, Ch. 3, Springer Handbook of Automation, 2009):

<table>
<thead>
<tr>
<th>Level</th>
<th>Automation</th>
<th>Automated Human Attribute</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>A_8</td>
<td>Mobile machine</td>
<td>Guided mobility</td>
<td>Hovering motes</td>
</tr>
<tr>
<td>A_9</td>
<td>Collaborative network</td>
<td>Collaboration</td>
<td>CI-Hub</td>
</tr>
<tr>
<td>A_10</td>
<td>Originality</td>
<td>Creativity</td>
<td>Virtual reality game</td>
</tr>
<tr>
<td>A_11</td>
<td>Human and animal special needs Support</td>
<td>Compassion</td>
<td>Nursing device</td>
</tr>
<tr>
<td>A_12</td>
<td>Interactive companion</td>
<td>Humor</td>
<td>Advisory agent</td>
</tr>
</tbody>
</table>

Study and Research Topics include:

1. e-Collaborative algorithms and protocols, and active interaction theories
2. Synchronization and recovery with wireless facility networks
3. Visual analytics and informatics for supply flow decisions
4. Swarm algorithms and sensor/RFID networks
5. Human-robot interaction and collaborative robotics

Requirements and Grading:

- Bi-weekly homework -- 35%;
- Mid-term take-home exam – 30%;
- Semester project (individual) in three parts – 35%.