To: The Faculty of the College of Engineering
From: School of Industrial Engineering
Subject: New Graduate Course: IE 52500

The faculty of the School of Industrial Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

Course No:  IE 52500 Healthcare Delivery Systems
Sem. 1. Class 3, Cr. 3.
Prerequisites: Graduate Standing in Engineering or consent of instructor.

Description: This course is to introduce the interconnected sectors in the complex US healthcare delivery systems, including in-patient care, emergency departments, surgical services, out-patient clinics, long-term care, pharmacies, laboratories, as well as supporting industries such as insurance, food services, information technologies, etc. The course focuses on the management of healthcare services by the industrial engineering principles and quantitative decision making methodologies.

Reasons: The course will be part of the Healthcare Systems Engineering Professional Master Degree to be established in the School of Industrial Engineering at West Lafayette campus. The mission of the Professional Master Degree in Healthcare System Engineering is to provide students with engineering, science and related background with the skills and visions to lead the healthcare organizations and its related industries in improving care quality, care safety, care access, equality, system efficiency, and cost effectiveness in healthcare systems. This proposed course will be part of the core courses to provide the healthcare delivery system background knowledge before the students engage in practical trainings and projects. No other graduate course of this kind is offered by the school.

Abhijit J. Deshmukh, Professor and Head
School of Industrial Engineering
Office of the Registrar
FORM 40G REV. 4/13

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

DEPARTMENT: Industrial Engineering
EFFECTIVE SESSION: Fall 2016

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: 52000
Long Title: Healthcare Delivery Systems
Short Title: Healthcare Delivery Systems

EXISTING:

Subject Abbreviation: IE
Course Number: 69000

TERMS OFFERED:

Check All That Apply:
- Fall
- Spring
- Summer

CAMPUS(ES) INVOLVED:

- Columbus
- Cont Ed
- Tech StateWide
- Pl. Wayne
- W. Lafayette
- Indianapolis

CREDIT TYPE:

1. Fixed Credit: Cr. Hrs.
   Minimum Cr. Hrs: 3
   Maximum Cr. Hrs: 3
   (Check One) Yes No

2. Variable Credit Range:
   Minimum Cr. Hrs: 3
   Maximum Cr. Hrs: 3
   (Check One) Yes No

3. Equivalent Credit:
   Yes No

4. Thesis Credits:
   Yes No

5. Pass/No Pass Only
   Satisfactory/Unsatisfactory Only
   Repeatable
   Maximum Repeatable Credits:
   Credit by Examination
   Fee
   Core
   Lab
   Rate Requested

COURSE ATTRIBUTES:

- Registration Approval Type
  Department
  Instructor
- Off Campus Experience

CROSS-LISTED COURSES

COURSE DESCRIPTION (INCLUDE REQUIREMENTS/RESTRICTIONS):

See supporting documents

See supporting documents

COURSE LEARNING OUTCOMES:

Calumet Department Head: Date
Calumet School Dean: Date
Calumet Director of Graduate Studies: Date

Fort Wayne Department Head: Date
Fort Wayne School Dean: Date
Fort Wayne Director of Graduate Studies: Date

Indianapolis Department Head: Date
Indianapolis School Dean: Date
IUPUI Associate Dean for Graduate Education: Date

North Central Department Head: Date
North Central School Dean: Date
North Central Director of Graduate Studies: Date

West Lafayette Department Head: Date
West Lafayette College/School Dean: Date
Date Approved by Graduate Council: Date

Graduate Area Committee Convener: Date
Graduate Dean: Date
Graduate Council Secretary: Date

OFFICE OF THE REGISTRAR
(Grad Form 40G [Excel format] - Does not include the Graduate Council's required supporting document. See pdf version of Form 40G)
Supporting Document to the Form 40G
for a New Graduate Course

To: Purdue University Graduate Council

From: Faculty Member: Yuehwern Yih

Department: Industrial Engineering
Campus: West Lafayette

Date: January 26, 2016

Subject: Proposal for New Graduate Course

Contact for information if questions arise:
Name: Yuehwern Yih, Ph.D.
Phone: (765) 494-0826
Email: yih@purdue.edu
Address: 241 Grissom Hall, 315 N. Grant St.
West Lafayette, IN 47907

Course Subject Abbreviation and Number: IE 52500

Course Title: Healthcare Delivery Systems

Course Description:

This course is to introduce the interconnected sectors in the complex US healthcare delivery systems, including in-patient care, emergency departments, surgical services, out-patient clinics, long-term care, pharmacies, laboratories, as well as supporting industries such as insurance, food services, information technologies, etc. The course focuses on the management of healthcare services by the industrial engineering principles and quantitative decision making methodologies.

Semesters Offered:

Every Spring semester initially; Additional offerings may be added at a later date.

A. Justification for the Course:

- Justification of Need
  The course will be part of the Healthcare Systems Engineering Professional Master Degree to be established in the School of Industrial Engineering at West Lafayette campus. The mission of the Professional Master Degree in Healthcare System Engineering is to provide students with engineering, science and related
background with the skills and visions to lead the healthcare organizations and its related industries in improving care quality, care safety, care access, equality, system efficiency, and cost effectiveness in healthcare systems. This proposed course will be part of the core courses to provide the healthcare delivery system background knowledge before the students engage in practical trainings and projects. No other graduate course of this kind is offered by the school.

- Justification of Level
  The target audience is for master students in Professional Master Degree in Healthcare System Engineering and regular Industrial Engineering program. Anticipated number is 25 students per class with approximate 5 undergraduate students and 20 students with graduate standing. The students will be evaluated through homework, midterm exam, attendance and in-class participation, project presentation, and final project report in terms of their abilities to synthesize the theories from technical materials in the problem solving process, their understanding of healthcare setting, and their communication skills.

An experimental course, IE 69000 Healthcare Delivery Systems, has been offered since 2010 with the following enrollments.
  o Spring 2010 – 14
  o Spring 2011 – 9
  o Fall 2012 – 12
  o Spring 2014 – 6
  o Spring 2015 – 13 (2 undergraduate students)
  o Spring 2016 – 12 (1 undergraduate student)

There is interest from senior undergraduate students in this course and by making this course 500-level instead of 600-level, it’s more accessible to undergraduate with appropriate prerequisites. This course contents cover an overview of the current research development and challenges of different service/industrial sectors associated with the healthcare delivery systems. Therefore, a 500-level number is more appropriate.

- Anticipated enrollment
  o Undergraduate 5
  o Graduate 20

B. Learning Outcomes and Method of Evaluation or Assessment:

- Objectives and Student Learning Outcomes
  o To develop capabilities of students to improve patient safety, care quality, and/or system efficiency in healthcare delivery systems with system modeling and decision making analytical methods.
    - To understand current performance assessment for healthcare
- **Methods of Evaluation**

Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.) Expand table rows as needed.

<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>Methods of Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>To understand current performance assessment for healthcare systems</td>
<td>Homework</td>
</tr>
<tr>
<td>To understand quantitative analytical tools and system/process modeling methods applied in current healthcare research areas</td>
<td>In-class Discussion; Paper review and Critique</td>
</tr>
<tr>
<td>To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers</td>
<td>Team Project (presentation, report)</td>
</tr>
</tbody>
</table>

- **Grading Criteria**

Grading criteria (select from checklist); include a statement describing the criteria that will be used to assess students and how the final grade will be determined. Add and delete rows as needed.

<table>
<thead>
<tr>
<th>Grading Criteria (replace with check for all that apply)</th>
<th>Weight Toward Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Paper Review and Critique</td>
<td>30%</td>
</tr>
<tr>
<td>Attendance and Class Participation</td>
<td>20%</td>
</tr>
<tr>
<td>Team Project Presentation</td>
<td>10%</td>
</tr>
<tr>
<td>Team Project Report</td>
<td>30%</td>
</tr>
</tbody>
</table>
Grading criteria are 5 homeworks (20%), one midterm exam (20%), final team project report (30%) and team project presentation (10%), and attendance and class participation (20%). The cutoffs for A, B, C, and D are 90, 80, 70, and 60 respectively.

- Methods of Instruction

Identify the method(s) of instruction and describe how the methods promote the likely success of the desired student learning outcomes. Add and delete rows as needed.

<table>
<thead>
<tr>
<th>Hours per Week</th>
<th>Method of Instruction (replace with check for all that apply)</th>
<th>Contribution to Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Lecture</td>
<td>15 of 16 weeks</td>
</tr>
<tr>
<td>3</td>
<td>Presentations</td>
<td>1 of 16 weeks</td>
</tr>
</tbody>
</table>

C. Prerequisite(s):

List prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence. Add bullets as needed.

- Graduate standing or permission of instructor

D. Course Instructor(s):

Provide the name, rank, and department/program affiliation of the instructor(s). Is the instructor currently a member of the Graduate Faculty? (If the answer is no, indicate when it is expected that a request will be submitted.) Add rows as needed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Dept.</th>
<th>Graduate Faculty or expected date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuehwern Yih</td>
<td>Professor</td>
<td>IE</td>
<td>Yes</td>
</tr>
<tr>
<td>Faculty</td>
<td>Professor</td>
<td>IE</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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 of 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. *(This information must be listed and may be copied from syllabus).*

<table>
<thead>
<tr>
<th>I. Healthcare Delivery System overview</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Performance Assessment and Process Improvement Management</td>
<td>2</td>
</tr>
<tr>
<td>III. System Engineering - Technologies and Methodologies</td>
<td>3</td>
</tr>
<tr>
<td>IV. Design, Planning, Control, and Management of Healthcare Systems</td>
<td></td>
</tr>
<tr>
<td>1. Preventive care</td>
<td>4</td>
</tr>
<tr>
<td>2. Telemedicine</td>
<td>5</td>
</tr>
<tr>
<td>3. Treatment plan and management</td>
<td>6</td>
</tr>
<tr>
<td>4. ED/ICU operation</td>
<td>7</td>
</tr>
<tr>
<td>5. OR management</td>
<td>8</td>
</tr>
<tr>
<td>6. Decontamination service</td>
<td>9</td>
</tr>
<tr>
<td>7. Infection control and pandemics planning</td>
<td>10</td>
</tr>
<tr>
<td>8. Transplant services and blood bank</td>
<td>11</td>
</tr>
<tr>
<td>9. Warehouse management and supply chain</td>
<td>12</td>
</tr>
<tr>
<td>10. Supporting services</td>
<td>13</td>
</tr>
<tr>
<td>11. Mental health</td>
<td>14</td>
</tr>
<tr>
<td>12. Tracking and Information Systems</td>
<td>15</td>
</tr>
<tr>
<td>V. Final project presentations</td>
<td>16</td>
</tr>
</tbody>
</table>

**F. Reading List (including course text):**

- Primary Reading List

- Secondary Reading List
  - *To Err is Human – Building a Safer Health System*, Committee on Quality on Health Care in America, Institute of Medicine, National Academies Press, 2000
  - *Crossing the Quality Chasm – A New Health System for the 21st Century*, Committee on Quality of Health Care in America, Institute of Medicine, National Academy Press, Washington DC,
  o  Handouts, lecture notes, and readings posted on Blackboard

G. Library Resources

Describe any library resources that are currently available or the resources needed to support this proposed course.

• Most readings available electronically through Purdue Libraries Systems

H. 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 Program.

See Appendix K.

IE 52500 Healthcare Delivery Systems

XXXXX 20XX
TR X:XX-X:XX pm GRIS XXX

Instructor: Y Yih, Ph.D., GRIS 241, yih@purdue.edu
Office Hours: XXXXXX


Optional Texts:
- To Err is Human – Building a Safer Health System, Committee on Quality on Health Care in America, Institute of Medicine, National Academies Press, 2000
- Crossing the Quality Chasm – A New Health System for the 21st Century, Committee on Quality of Health Care in America, Institute of Medicine, National Academy Press, Washington DC, 2001.

Other reading materials (research papers) will be assigned throughout the semester.

This course is to introduce the complex US healthcare systems, review the state-of-the-art Industrial Engineering applications in healthcare, and identify the areas for future research directions. Students are expected to read the assigned materials in advance and take active roles in discussion of book chapters and research papers.

The course objective is to develop capabilities of students to improve patient safety, care quality, and/or system efficiency in healthcare delivery systems with system modeling and decision making analytical methods.

Expected learning outcomes:
- To understand current performance assessment for healthcare systems
- To understand quantitative analytical tools and system/process modeling methods applied in current healthcare research areas
- To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers

Course Outline:

<p>| I. Healthcare Delivery System overview | Week 1 |
| II. Performance Assessment and Process Improvement Management | Week 2 |
| III. System Engineering - Technologies and Methodologies | Week 3 |
| IV. Design, Planning, Control, and Management of Healthcare Systems | |</p>
<table>
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Grading Policy:

10% Homework  
20% Attendance and Participation in class  
30% Paper Review and Critique  
10% Team Project Presentation  
30% Team Project Report (Due on Monday 5:00 PM of Final Week)

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. The information about changes in this course will be posted on Blackboard.