

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 have approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

IE 52500 Healthcare Delivery Systems

Sem. 2. Class 3, Cr. 3.

Prerequisites: Graduate Standing in Engineering or consent of instructor
(undergraduate prerequisites: IE 33500, IE 38300 or equivalent)

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.

Reasons: IE 690 Healthcare Delivery Systems has been offered as an experimental course since 2010 with the following enrollments.

Spring 2010 – 14

Spring 2011 – 9

Fall 2012 – 12

Spring 2014 – 6

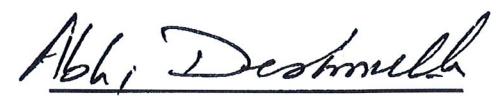
Spring 2015 – 13 (2 undergraduate students)

Spring 2016 – 12 (1 undergraduate student)

The enrollment is expected to increase once the Professional Master Degree in Healthcare Systems Engineering is established. There is increasing interest from undergraduate students in this course and by making this course 500-level, it's more accessible to undergraduate with appropriate prerequisites. This course focuses on the overview and introduction of the current development and challenges of different service/industrial sectors in healthcare delivery systems. Therefore, a 500-level number is more appropriate.

Approved for the faculty of the Schools
of Engineering by the Engineering
Curriculum Committee

ECC Minutes #3 Date 10-18-16
Chairman ECC 


Abhijit J. Deshmukh, Professor and Head
School of Industrial Engineering

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

PRINT

DEPARTMENT Industrial Engineering EFFECTIVE SESSION Fall 2016

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

<input checked="" type="checkbox"/> 1. New course with supporting documents (complete proposal form)	<input type="checkbox"/> 7. Change in course attributes
<input type="checkbox"/> 2. Add existing course offered at another campus	<input type="checkbox"/> 8. Change in instructional hours
<input type="checkbox"/> 3. Expiration of a course	<input type="checkbox"/> 9. Change in course description
<input type="checkbox"/> 4. Change in course number	<input type="checkbox"/> 10. Change in course requisites
<input type="checkbox"/> 5. Change in course title	<input type="checkbox"/> 11. Change in semesters offered
<input type="checkbox"/> 6. Change in course credit/type	<input type="checkbox"/> 12. Transfer from one department to another

PROPOSED: Subject Abbreviation <u>IE</u> Course Number <u>52500</u> Long Title <u>Healthcare Delivery Systems</u> Short Title <u>Healthcare Delivery Systems</u> <small>Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)</small>	EXISTING: Subject Abbreviation <u>IE</u> Course Number <u>69000</u>	TERMS OFFERED Check All That Apply: <input checked="" type="checkbox"/> Fall <input checked="" type="checkbox"/> Spring <input checked="" type="checkbox"/> Summer CAMPUS(ES) INVOLVED <input type="checkbox"/> Calumet <input type="checkbox"/> N. Central <input checked="" type="checkbox"/> Cont Ed <input type="checkbox"/> Tech Statewide <input type="checkbox"/> Ft. Wayne <input checked="" type="checkbox"/> W. Lafayette <input type="checkbox"/> Indianapolis
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CREDIT TYPE 1. Fixed Credit: Cr. Hrs. <u>3</u> 2. Variable Credit Range: Minimum Cr. Hrs. _____ (Check One) To <input type="checkbox"/> Or <input type="checkbox"/> Maximum Cr. Hrs. _____ 3. Equivalent Credit: Yes <input type="checkbox"/> No <input type="checkbox"/> 4. Thesis Credit: Yes <input type="checkbox"/> No <input type="checkbox"/>	COURSE ATTRIBUTES: Check All That Apply 1. Pass/Not Pass Only <input type="checkbox"/> 2. Satisfactory/Unsatisfactory Only <input type="checkbox"/> 3. Repeatable <input type="checkbox"/> Maximum Repeatable Credit: _____ 4. Credit by Examination <input type="checkbox"/> 5. Fees <input type="checkbox"/> Coop <input type="checkbox"/> Lab <input type="checkbox"/> Rate Request <input type="checkbox"/> Include comment to explain fee _____ 6. Registration Approval Type <input type="checkbox"/> Department <input type="checkbox"/> Instructor <input type="checkbox"/> 7. Variable Title <input type="checkbox"/> 8. Honors <input type="checkbox"/> 9. Full Time Privilege <input type="checkbox"/> 10. Off Campus Experience <input type="checkbox"/>
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Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated	Cross-Listed Courses
Lecture	75	2	16	100	
Recitation					
Presentation					
Laboratory					
Lab Prep					
Studio					
Distance					
Clinic					
Experiential					
Research					
Ind. Study					
Pract/Observ					

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

See supporting documents

COURSE LEARNING OUTCOMES:

See supporting documents

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 <u>Ally DeCobelli</u> <u>3/8/16</u> Date _____	West Lafayette College/School Dean <u>Michael P. Quinn</u> <u>10/2/16</u> Date _____	Date Approved by Graduate Council _____ Date _____
Graduate Area Committee Convener _____ Date _____	Graduate Dean _____ Date _____	Graduate Council Secretary _____ Date _____
		West Lafayette Registrar _____ Date _____

(Supporting Materials from Form 40-G)

A. Justification for the Course:

- The course is proposed to be part of the Healthcare Systems Engineering Professional Master Degree 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 background knowledge before the students engage in practical training. No other graduate course of this kind is offered by the school.
- The target audience is for master students in Professional Master Degree in Healthcare System Engineering and regular Industrial Engineering program. Anticipated number is 20 students per class with approximate 5 undergraduate students and 15 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.
- Anticipated enrollment
 - Undergraduate 5
 - Graduate 15

B. Learning Outcomes and Method of Evaluation or Assessment:

- Objectives and Student Learning Outcomes
 - 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
 - To develop skills in decision making and problem solving by quantitative analytical tools and system/process modeling
 - To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers

- Methods of Evaluation

Learning Objective	Methods of Evaluation
To understand current performance assessment for healthcare	Homework
To develop skills in decision making and problem solving by quantitative analytical tools and system/process modeling	Midterm exam
To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers	Project (presentation, report)

- Grading Criteria

Grading Criteria (replace with check for all that apply)	Weight Toward Final Grade
Homework	20%
Midterm Exam	20%
Attendance and Class Participation	20%
Project Presentation	10%
Project Report	30%

Grading criteria are 5 homeworks (20%), one midterm exam (20%), final project report (30%) and 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

Hours per Week	Method of Instruction (replace with check for all that apply)	Contribution to Outcomes

3	Lecture	Provide instructions and facilitate discussions
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C. Prerequisite(s):

- Graduate standing – requires admission to the graduate program
- Undergraduate students prerequisite: IE 33500, IE 38300 or equivalent

D. Course Instructor(s):

Name	Rank	Dept.	Graduate Faculty or expected date
Yuehwern Yih	Professor	IE	Yes

E. Course Outline:

- I. Healthcare Delivery System overview
- II. Performance Assessment and Process Improvement Management
- III. System Engineering - Technologies and Methodologies
- IV. Design, Planning, Control, and Management of Healthcare Systems
 - Preventive care
 - Telemedicine
 - Treatment plan and management
 - ED/ICU operation
 - OR management
 - Decontamination service
 - Infection control and pandemics planning
 - Transplant services and blood bank
 - Warehouse management and supply chain
 - Supporting services
 - Mental health
 - Tracking and Information Systems

F. Reading List (including course text):

- Primary Reading List
 - Yih, Y. (editor) *Handbook of Healthcare Delivery Systems*, CRC Press, 2011.
- 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, 2001.

G. Library Resources

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

- Purdue Libraries

**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:

Subject: Proposal for New Graduate Course

Contact for information if questions arise: Name: Yuehwern Yih
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:

For the benefit of graduate student plan of study development, how frequently will this prototype be offered? Which semesters?

Every Spring semester initially; if there is demand, the course may be offered in Fall semester and Summer as well.

IE 690 Healthcare Delivery Systems has been offered as an experimental course since 2010 with the following enrollments.

Spring 2010 – 14

Spring 2011 – 9

Fall 2012 – 12

Spring 2014 – 6

Spring 2015 – 13 (2 undergraduate students)

Spring 2016 – 12 (1 undergraduate student)

The enrollment is expected to increase once the Professional Master Degree in Healthcare Systems Engineering is established. There is increasing interest from undergraduate students in this course and by making this course 500-level, it's more accessible to undergraduate with appropriate prerequisites. This course focuses on the overview and introduction of the current development and challenges of different service/industrial sectors in healthcare delivery systems. Therefore, a 500-level number is more appropriate.

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.

Justify the level of the proposed graduate course (500- or 600-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 course is proposed to be part of the Healthcare Systems Engineering Professional Master Degree 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 background knowledge before the students engage in practical training. No other graduate course of this kind is offered by the school.
- The target audience is for master students in Professional Master Degree in Healthcare System Engineering and regular Industrial Engineering program. Anticipated number is 20 students per class with approximate 5 undergraduate students and 15 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.

- Use the following criteria:
Graduate Council policy requires that courses at the 50000 level in the Purdue system should be taught at the graduate level and meet four criteria: a) the use of primary literature in conjunction with advanced secondary sources (i.e., advanced textbooks); b) assessments that demonstrate synthesis of concepts and ideas by students; c) demonstrations that topics are current, and; d) components that emphasize research approaches/methods or discovery efforts in the course content area (reading the research, critiquing articles, proposing research, performing research). Such courses should be taught so that undergraduate students are expected to rise to the level of graduate work and be assessed in the same manner as the graduate students.

- Anticipated enrollment
 - Undergraduate 5
 - Graduate 15

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.). Expand lists and sub lists as needed.

- Objectives and Student Learning Outcomes
 - 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
 - To develop skills in decision making and problem solving by quantitative analytical tools and system/process modeling
 - To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers

- 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.

Learning Objective	Methods of Evaluation
To understand current performance assessment for healthcare	Homework
To develop skills in decision making and problem solving by quantitative analytical tools and system/process modeling	Midterm exam
To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers	Project (presentation, report)

- **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.

Grading Criteria (replace with check for all that apply)	Weight Toward Final Grade
Homework	20%
Midterm Exam	20%
Attendance and Class Participation	20%
Project Presentation	10%
Project Report	30%

Grading criteria are 5 homeworks (20%), one midterm exam (20%), final project report (30%) and 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.

Hours per Week	Method of Instruction (replace with check for all that apply)	Contribution to Outcomes
3	Lecture	Provide instructions and facilitate discussions
	Recitation	[click here and explain contribution]
	Presentation	[click here and explain contribution]
	Laboratory	[click here and explain contribution]
	Lab Prep	[click here and explain contribution]
	Extra Credit	[click here and explain contribution]
	Studio	[click here and explain contribution]
	Distance	[click here and explain contribution]
	Clinic	[click here and explain contribution]
	Experiential	[click here and explain contribution]
	Research	[click here and explain contribution]
	Independent Study	[click here and explain contribution]
	Practice/Observation	[click here and explain contribution]
	Seminar	[click here and explain contribution]

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 – requires admission to the graduate program
- Undergraduate students prerequisite: IE 33500, IE 38300 or equivalent

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.

Name	Rank	Dept.	Graduate Faculty or expected date

Yuehwern Yih	Professor	IE	Yes
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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.

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

- I. Healthcare Delivery System overview
- II. Performance Assessment and Process Improvement Management
- III. System Engineering - Technologies and Methodologies
- IV. Design, Planning, Control, and Management of Healthcare Systems
 - Preventive care
 - Telemedicine
 - Treatment plan and management
 - ED/ICU operation
 - OR management
 - Decontamination service
 - Infection control and pandemics planning
 - Transplant services and blood bank
 - Warehouse management and supply chain
 - Supporting services
 - Mental health
 - Tracking and Information Systems

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.

A secondary reading list or bibliography should include material students may use as background information.

- Primary Reading List
 - Yih, Y. (editor) *Handbook of Healthcare Delivery Systems*, CRC Press, 2011.
- 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, 2001.

G. Library Resources

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

- Purdue Libraries

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.

http://www.purdue.edu/gradschool/faculty/documents/Graduate_School_Policies_and_Procedures_Manual.pdf

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

Textbook (required): Yih, Y. (editor) Handbook of Healthcare Delivery Systems, CRC Press, 2011.

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
- To develop skills in decision making and problem solving by quantitative analytical tools and system/process modeling
- To develop proficiency in selecting analytical methods that are appropriate for addressing specific problems for healthcare providers

Course Outline:

- I. Healthcare Delivery System overview (Week 1)**
- II. Performance Assessment and Process Improvement Management (Week 2)**
- III. System Engineering - Technologies and Methodologies (Weeks 3)**
- IV. Design, Planning, Control, and Management of Healthcare Systems (Weeks 4-14)**

1. Preventive care

2. Telemedicine
3. Treatment plan and management
4. ED/ICU operation
5. OR management
6. Decontamination service
7. Infection control and pandemics planning
8. Transplant services and blood bank
9. Warehouse management and supply chain
10. Supporting services
11. Mental health
12. Tracking and Information Systems

V. Final project presentations (Weeks 15)

Grading Policy:

- 20% Homework (5)
- 20% Attendance and Participation in class
- 20% Midterm Exam
- 10% Project Presentation
- 30% Project report

The cutoffs for A, B, C, and D are 90, 80, 70, and 60 respectively.

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.