Office of the Registrar
FORM 40 REV. 5/11

PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

Print Form

DEPARTMENT School of Engineering Education EFFECTIVE SESSION Fall 2013 (201410)

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

- [X] 1. New course with supporting documents
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes (department head signature only)
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisites
- [ ] 11. Change in semesters offered (department head signature only)
- [ ] 12. Transfer from one department to another

PROPOSED:		EXISTING:	
Subject Abbreviation	ENGR	Subject Abbreviation	
Course Number	20100	Course Number	
Long Title	Engineering in Global Context		
Short Title	Engineering in Global Context		

Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

TERMS OFFERED
Check All That Apply:
[ ] Fall [X] Spring [X] Summer

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [X] W. Lafayette
[ ] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs.
3. Equivalent Credit: Yes [ ] No [ ]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Fees: [ ] Coop [ ] Lab [ ] Rate Request
Include comment to explain fee
6. Registration Approval Type
Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

ScheduleType	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	50	3	16	100
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses
RECEIVED
APR 23 2013
OFFICE OF THE REGISTRAR

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
This course provides students with opportunities to study how engineering is intertwined with larger economic, social, cultural, and technological dynamics in an era of intensified globalization. Its major goals are to help students understand and appreciate what engineering is, how engineers are trained, what engineers do, and how engineering and society interact. The course approaches these themes through discussion of: the relation and interaction of engineering, science, technology, and society; the historical origins and development of engineering as a profession; diversity issues in engineering and other STEM fields; engineering in cross-national/cultural contexts; and contemporary challenges related to globalization, ethics, and sustainability. Prerequisite: None

*COURSE LEARNING OUTCOMES:
1. Describe and evaluate the specific kinds of knowledge and methods typically employed by engineers, including in comparison with other professional fields; 2. Understand the historical development of engineering education and the engineering profession in the United States; 3. Recognize how national differences are important in engineering work, including by comparing and contrasting different national cultures and styles of engineering; 4. Explain the significance of diversity in engineering education and professional practice, including by evaluating competing perspectives on diversity in different historical and sociocultural contexts; 5. Understand contemporary trends and issues related to globalization, ethics, social responsibility, and sustainability, and interpret their significance in relation to engineering education

Calumet Department Head	Date	Calumet School Dean	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date
Indianapolis Department Head	Date	Indianapolis School Dean	Date
North Central Faculty Senate Chair	Date	Vice Chancellor for Academic Affairs	Date
West Lafayette Department Head	2/13/13 Date	West Lafayette College/School Dean	4/19/13 Date
		West Lafayette Registrar	4/27/13 Date

OFFICE OF THE REGISTRAR

4-2-13
LD 4/26/13

ENGR 20100

TO: The Faculty of the College of Engineering

FROM: School of Engineering Education

RE: New Undergraduate Course: ENGR 20100 – Engineering in Global Context

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

ENGR 20100 Engineering in Global Context
Sem. 1 and 2, Cr 3
Requisites, Restrictions, and Attributes: None

Description: This course provides students with opportunities to study how engineering is intertwined with larger economic, social, cultural, and technological dynamics in an era of intensified globalization. Its major goals are to help students understand and appreciate what engineering is, how engineers are trained, what engineers do, and how engineering and society interact. The course approaches these themes through discussion of: the relation and interaction of engineering, science, technology, and society; the historical origins and development of engineering as a profession; diversity issues in engineering and other STEM fields; engineering in cross-national/cultural contexts; and contemporary challenges related to globalization, ethics, and sustainability. In summary, the course is designed to help students understand what it means to identify as, and/or work with, engineers. Recitation sections and/or independent projects (at the instructor's discretion) provide further opportunities for students to expand their knowledge and improve their skills in relation to course themes.

Reason: This course responds to growing demand for technically-astute engineering graduates who better understand the development and contemporary status of their profession, and who can work effectively across countries and cultures. More specifically, the course addresses multiple ABET 3.a-k outcomes, including (f) professional and ethical responsibility, (g) communicate effectively, (h) understanding the impact of engineering solutions in a global, economic, environmental, and societal context, and (j) knowledge of contemporary issues. By involving substantial numbers of non-engineering students, the course also helps remedy public misunderstandings about engineering, while building bridges between students from across the university. We expect the course will mainly fulfill Core Curriculum requirements for engineering and non-engineering students. It will be nominated in the Core Curriculum STS category, addressing learning outcomes in the following areas: Human Cultures, Ethical Reasoning, and Global Citizenship and Social Responsibility. The proposing faculty will work with units across campus to determine how the course meets specific plan of study requirements, with emphasis on degree programs in engineering, business, STEM education, and technology.

Engineering in Global Context is significantly based on Engineering Cultures, an undergraduate elective course originally developed at Virginia Tech and offered more than 50 times to more than 3,000 students since 1989, including in face-to-face and online formats. Prof. Jesiek, the main developer of Engineering in Global Context, served as teaching assistant or instructor for Engineering Cultures eight times while at Virginia Tech, and was also a content developer. During Spring 2012, Engineering in Global Context was piloted by Prof. Harris as ENGR19500-004 with three students completing the class. The results were positive and there is enthusiasm for approving the course and scaling up enrollment. However, the lack of a permanent course number is a major barrier, as ENGR195 classes often map poorly to plan of study requirements.

David F. Radcliffe
Kamyar Haghighi Head, School of Engineering Education
Epistemology Professor of Engineering Education

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #12

Date 4/19/2013

Chairman ECC

ENGR 20100

ENGR 20100
Engineering in Global Context

INSTRUCTORS	OFFICE	PHONE	EMAIL
Dr. Brent Jesiek	ARMS 1313	496-1531	bjesiek@purdue.edu
Dr. Mike Harris	FRNY 3043	494-4966 or 494-0963	mtharris@purdue.edu

COURSE DESCRIPTION

This course examines how engineering is intertwined with larger economic, social, cultural, and technological dynamics in an era of intensified globalization. Its major goals are to help you understand and appreciate what engineering is, how engineers are trained, what engineers do, and how engineering and society interact. The course approaches these themes through discussion of: the relation and interaction of engineering, science, technology, and society; the historical origins and development of engineering as a profession; diversity issues in engineering and other STEM fields; engineering in cross-national/cultural contexts; and contemporary challenges related to globalization, ethics, and sustainability. In summary, the course is designed to help students understand what it means to identify as, and/or work with, engineers. Recitation sections and/or independent projects provide further opportunities to expand your knowledge and improve your skills in relation to the major course topics and themes.

COURSE LEARNING OUTCOMES

Students who successfully complete this course should have the ability to:

1. Describe and evaluate the specific kinds of knowledge and methods typically employed by engineers, including in comparison with other professional fields,
2. Understand the historical development of engineering education and the engineering profession in the United States,
3. Recognize how national differences are important in engineering work, including by comparing and contrasting different national cultures and styles of engineering,
4. Explain the significance of diversity in engineering education and professional practice, including by evaluating competing perspectives on diversity in different historical and sociocultural contexts,
5. Understand contemporary trends and issues related to globalization, ethics, social responsibility, and sustainability, and interpret their significance in relation to engineering education and practice, and
6. Demonstrate written communication capabilities at the level of "emerging" or higher (as defined by the Purdue Core Curriculum guidelines).

READING LIST/TEXTBOOK

There is no required textbook for this class. However, key papers are assigned during the semester. Extensive lecture slides are also made available to students. Readings are mainly from:

- Christensen, S. H., Delahousse, B., & Meganck, M. (2009). *Engineering in Context*. Aarhus, Denmark: Authors and Academica. ISBN #978-87-7675-700-7
- Collins, H. & Pinch, T. (1998). *The Golem at Large: What you should know about technology*. Cambridge, UK: Cambridge University Press. ISBN # 0-521-01270-8
- Johnston, S. F., Gostelow, J. P., & King, J. W. (2000). *Engineering and Society*. Upper Saddle River, NJ: Prentice Hall, Inc. ISBN #0-201-36141-8
- Meiksins, P., & Smith, C. (1996). *Engineering Labour: Technical Workers in Comparative Perspective*. London and New York: Verso. ISBN #1-85984-135-X
- Reynolds, T. S. (1991). *The Engineer in America*. Chicago: The University of Chicago Press. ISBN # 0-226-71032-7

COURSE SCHEDULE and OUTLINE

Week	Topics	Assignment No. Due
1	**Introduction and Overview:** What is engineering?; Relation of engineering, science, technology, society	
2	**Engineering Problem Solving with People:** Culture as dominant images; Engineering cultures framework; Participant observation strategies to help students and professionals cross boundaries	1
3	**Early History of Engineering:** Origins of engineering and engineering education in Britain, France, and Germany; Early history of engineering education and profession in the United States	2
4		
5	**20th Century Trends and Changes:** Key American engineering projects; engineers and their place in corporations; engineers in management and government; the rising prominence of science	
6		3
7		
8	**Engineering Disciplines:** The expanding fields of engineering	
9	**Diversity in Engineering:** Diversity challenges in engineering, including gender, race, ethnicity, (dis)ability, etc.	
10	**Engineering Cultures:** Case studies on engineering education and practice in select countries and regions around the world, with a focus on historical developments and contemporary trends	4
11		
12	**Ethics and Social Responsibility:** Engineering ethics, engineering and the public, social risks of engineering and technology	5
13	**Engineering for a Better World:** Humanitarian engineering, engineering and sustainability, engineering and social justice	

Week	Topics	Assignment No. Due
14	**Engineering – Past, Present, and Future:** History of Purdue engineering, future visions of engineering, Engineer of 2020	6
15	**Final Project Report and Presentation:** Presentations on final project work completed in recitation sections and on teams	7

GRADING POLICY	PERCENT	SCALE
Class Participation	25%	A = 90 - 100
Homework Assignments 1-6 (5% each)	30%	B = 80 - 89
Midterm Exam	25%	C = 70 - 79
Final Project Report and Presentation	20%	D = 60 – 69
		F < 60

ASSIGNMENTS and GRADING

NOTES: Relevant learning objectives indicated in brackets. (I) indicates individual assignment, (G) indicates group assignment, and (I+G) indicates mix of individual and group assignment components. Typical expected minimum length of each assignment is 500-1000 words.

Assignment #1: Reflecting on Dominant Images and Personal Pathways [O4, O6] (I)

This assignment challenges students to describe their personal pathway into engineering (or another field), including by discussing the images and forces shaping their perceptions and decisions. They are also asked to discuss their motivations and goals with respect to the course.

Assignment #2: Engineering Problem Solving with People [O1, O6] (I)

In this assignment, students read a historical case study about developing a new type of engine at General Motors in the 1920s, highlighting tensions between design and manufacturing. They are asked to analyze the two main perspectives using a framework from class. (See full text below.)

Assignment #3: Case Histories - American Engineering [O2, O6] (I)

Since the course can formally cover only a small fraction of the history of U.S. engineering education and practice, this assignment gives students an opportunity to delve more deeply into a historical case of their choosing, including by writing a critical summary and review of the case.

Assignment #4: Develop Your Own Reform Movement [O4, O6] (I)

This assignment asks students to create a formal memo describing a proposal for reforming how students are educated in engineering (or, for non-engineers, their current field of study).

They are asked to make a persuasive case by using empirical evidence and responding to competing views. Students are particularly encouraged (but not required) to address diversity issues and themes.

Assignment #5: Engineers in Dialog [O3, O5] (G)

Working in groups, students first imagine a team of engineers from three or more countries coming together around a shared project or problem. They then write a dialog/script highlighting how the engineers might interact, each potentially influenced by their unique cultural background.

Assignment #6: Case Studies – Ethics and Social Responsibility [O5, O6] (I)

Students select a case study involving issues of ethics and/or social responsibility in engineering. They are then asked to write a systematic analysis of the case to identify the key stakeholders, relevant moral theories and factors, and possible courses of action and their implications.

Assignment #7: Final Project Report and Presentation [O6, others TBD as relevant] (I+G)

Involves collaboratively writing a ~10-15 page research report on the historical development and/or current status of engineering education and practice in a country not discussed in class, and delivering a 10-minute presentation (with 10-20 PowerPoint slides) summarizing the findings.

Sample Assignment #2: Engineering Problem Solving with People [O1, O6] (I)

Stuart Leslie's article "Charles F. Kettering and the Copper-cooled Engine" highlights a struggle between two different engineering perspectives working towards a copper-cooled engine for General Motors. For this assignment, you will apply the Engineering Problem Solving with People framework to systematically analyze the two major perspectives in this case. First, write a one-paragraph summary of the article. Then adopt Kettering's perspective and in approximately one paragraph describe his location (organizational, geographical, etc.), knowledge (including skills, expertise, etc.), and desire (personal and professional goals). Then turn to the perspective of the manufacturing engineers and production staff, and in another paragraph describe their location, knowledge, and desire. Finally, in a concluding paragraph develop your own critical assessment of this case study, including by giving your interpretation of the biggest gaps in perspective between the two main stakeholder groups. Make sure you discuss how such issues might be remedied or addressed, and by whom.

Sample Assignment Grading Rubric

CRITERIA	SCORE		
	2	1.5	1/0.5/0
Structure	Essay is easy to follow and organized in a logical manner.	Essay is somewhat easy to follow and moderately well-organized.	Essay is difficult to follow and poorly organized.

CRITERIA	SCORE		
	2	1.5	1/0.5/0
Content	Essay addresses the required content completely.	Essay strays somewhat from the required content.	Essay does not address the required content.
Format	Essay follows the required format.	Essay mostly follows the required format.	Essay does not follow the required format.
Mechanics	Very few or no obvious grammar or spelling errors.	Some grammar and spelling errors.	Many grammar and spelling errors.
Completion	Essay meets the required length.	Essay falls somewhat short of the required length.	Essay is much shorter than required.

LATE POLICY/ATTENDANCE

1. Attendance at all classes is EXPECTED. Excessive absences may result in penalties up to a failing grade in the class and may be reported to the Dean of Students for appropriate action. Any adverse circumstances that may impact your ability to attend and/or participate in the class should be proactively discussed with the course instructors.
2. All homeworks are due at the beginning of each class. Late homework is NOT accepted.
3. All quizzes and/or exams are closed book and closed notes.
4. There are no makeup quizzes or exams.
5. You are expected to act ethically and professionally. Do NOT submit work (homework, quizzes, or exams) that is not entirely your own work (or the work of your group, when indicated). Evidence of cheating and other forms of dishonesty will result in penalties up to a failing grade in the course and reporting the violation to the Dean of Students.
6. Excessive talking or other distractions (e.g., surfing the web) during lectures and other class activities constitutes a lack of class participation, and may result in the lowering of your overall grade up to failure of the course.

REASONABLE ACCOMODATION POLICY

If you are a person with special circumstances that may affect your class performance (e.g., visual, hearing or learning disabilities or language differences) please let us know so that we can discuss and make appropriate accommodations.

EMERGENCY PROVISIONS

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. Here are ways to get information about changes in this course: Blackboard course web page, instructors' e-mail, and instructors' office phone.