TO: The Faculty of the College of Engineering

FROM: Global Engineering Programs and Partnerships

RE: New Undergraduate Course (Course Number Change) – GEP 29700: Research and Design for the Global Grand Engineering Challenges

Global Engineering Programs and Partnerships (GEP²) is requesting the re-assignment of one of the sections of GEP 20000 - Global Design Team to a new course number: GEP 29700. In 2017, GEP² started offering the course *Research and Design for the Global Grand Engineering Challenges* as one of the GEP 20000 options. Given the nature of the course and how it differs from other GEP 20000 Global Design Teams (GDTs) and/or other related independent study experiences, we propose a separate and unique course number for the aforementioned course: GEP 297000. This course addition/change will establish the course's independence and the fact that it cannot be substituted by any of the other GEP 20000 options.

Summary of Changes:

Add the course below:

1. GEP 29700: Research and Design for the Global Grand Engineering Challenges (2 credits)

NOTE: This course is currently being offered under the course number GEP 20000.

Rational:
Global Engineering Programs and Partnerships (GEP²) has facilitated various sections of GEP 20000 in the past. In 2017, we developed a new course: *Research and Design for the Global Grand Engineering Challenges*, which initially fell as a course option under this category. However, the course is different from other *Global Design Teams* and/or related independent study projects that use the course number GEP 20000. The course *Research and Design for the Global Grand Engineering Challenges* is offered as an optional continuation for students who take ENGR 103: *Innovations for the Global Grand Engineering Challenges*. That is, ENGR 103 is a pre-requisite for students taking the proposed course (GEP 297000). These two courses are part of the Global Engineering Learning Communities. The proposed course, GEP 29700, was designed with global engineering and intercultural learning outcomes in mind. It allows the students to interact with faculty mentors and contribute to ongoing research projects. Students enrolled in this course present the results of their research/prototypes in an International Development Exposition. GEP 29700 also aligns with the college's *Global Competence Initiative* (GCI) as it adds intentional global and intercultural development activities and exposes students to the differences in engineering practice worldwide. Preliminary data collected in the proposed course have shown significant intercultural learning gains. Given the nature of the course and the fact that it cannot be substituted for any of the GEP 20000 offerings, we would like to establish a different course number for it. Please refer to Appendix A. to review the course syllabus.

George Chiu					Date: April 8, 2019
Assistant Dean of Global Programs and Partnerships
and Professor of Mechanical Engineering

Appendix A.

INSTRUCTORS

Dr. Heidi Parker
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Dr. Jennifer DeBoer
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ASSISTANT

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COURSE DESCRIPTION

Welcome to **RESEARCH AND DESIGN FOR GLOBAL ENGINEERING GRAND CHALLENGES**! This is the second step on your journey to becoming a **GLOBAL ENGINEER**.

During this course, you will work alongside world-renowned Purdue faculty to expand upon your knowledge of the Engineering Grand Challenges through **hands-on research**, **team work**, **design**, and **iteration**.

This course is designed to give you a greater level of global competence in the following areas:

- **Technical Expertise** -> get hands on experience with engineering practice and design aimed at solving one or more grand engineering challenge/s.
- **Professional Development** -> expand your ability to work on a diverse team and your ability to present at global engineering expos and campus symposiums. You will also work with and receive mentorship from world-class global engineering faculty at Purdue.
- **Personal and Intercultural Development** -> continue to develop awareness of one's own multi-cultural personality, cultural intelligence, and cross-cultural communication styles and problem-solving strategies.

This course is a component of the Global Engineering Learning Community. Students in this class were enrolled in *ENGR 103 Innovations for Global Engineering Grand Challenges* during the Fall semester and have chosen to continue pursuing their passion for solving global issues through participating in this continuation of the Learning Community. If you are not a member of the Learning Community or have other concerns about this structure, please let us know.

14 Grand Challenges for Engineering in the 21st Century

COURSE LEARNING OUTCOMES

By taking this course you will be able to:

- Apply knowledge of at least one *Engineering Grand Challenge*.
- Design and iterate a prototype that addresses a *Grand Engineering Challenge* in a specific world region.
- Participate in a research project with a publishable output.
- Collaborate in diverse teams to solve complex problems.
- Gain professional experience by presenting a poster at on-campus conferences.
- Continue to develop global competency, or the knowledge, ability, and predisposition to work effectively   with people who define and solve problems differently than you.

COURSE FORMAT

This course meets **twice a month** (except for January): one time for *Deep Dives* and another for *Project Updates**

Deep Dive Sessions

Deep Dives are your chance to talk and learn about global issues that matter. It is important for engineers to study and learn how various global issues – and the controversies that surround them- are a part of the engineering design process and problem solving. In today's ever globalizing world, young people and their fresh ideas are key to solving some of the world's greatest challenges in water, energy, education, health, food, and more. *Deep Dive* sessions will involve in-depth discussions about topics that matter – poverty, diversity, inequality, infrastructure, rapid urbanization, and others and how they affect the ability of engineers to perform in today's global workspace. You will also learn about how specific world regions are affected by these various issues and how to make sure that your project ideas are taking into account the social, economic, cultural, and political differences that exist within your community of choice.

Sample Deep Dive Topics

- How does poverty and inequality prevent access to opportunity?
- How does government policy affect engineering technology?
- Sustainability: A balance of Economic, Environmental, and Social
- Connecting the private and public sector
- Global Engineering case studies

Project Updates Sessions

These sessions are designed to keep you on track with your project and related deliverables (prototype, poster, etc.). Some of these meetings will be with your faculty mentors and others with the course instructors.

*NOTE: There will be four (4) meetings in January and 2 meetings per month in the rest of the semester.

You and your team will be expected to provide a monthly update regarding the status of your project. This includes a 10-minute presentation outlining the following aspects of the project:

Project Overview
- ❏ Project Summary
- ❏ Team
- ❏ Faculty Mentor
- ❏ Resources

Milestones and Deliverables
- ❏ Percent Complete
- ❏ Planned start, planned finish
- ❏ Actual start, actual finish

Team Progress
- ❏ Tasks completed since last meeting
- ❏ Collaboration update

Feasibility Assessment
- ❏ Costs
- ❏ Implementation

Issues and Risks
- ❏ Issues and Challenges overcome
- ❏ New issues and challenges identified

icons adapted from projectmanager.com

You and your team are also expected to work on your project outside of scheduled class meetings and collaborate with your faculty mentor/s and course instructors as needed. Part of the deliverables of this class is to present your poster at the Annual I2D Exposition Poster Session (March 29th, 2019).

COURSE CALENDAR

Date	Time	Location	What's Happening	Assignments Due**
1/9/2019			Course Introduction, Ideation, Contracts, Mentor Meeting	Team Contract (will be done during class)
1/16/2019			Mentor Meeting Time	Research Project Charter Draft 1
1/23/2019			Deep Dive Session 1	Pre-reading when assigned
1/30/2019	5:30-7:00 p.m.	ARMS 3109	Project Update 1	10-minute team presentation Research Project Charter Draft 2
2/13/2019			Deep Dive Session 2	Pre-reading when assigned
2/27/2019			Project Update 2	10-minute team presentation
3/20/2019			Project Update 3	Poster Draft 1 due; 10-minute team presentation
3/27/2019			Poster Practice Presentation	5-minute poster pitch with Q&A from mentors and peers
3/29/2019	11:30 am – 1:20 pm	ARMS Atrium	I2D Poster Session	Poster Final Draft (Due at poster session)
3/29/2019	*All Day; Various Locations in ARMS*			I2D Exposition
4/10/2019	5:30-7:00 p.m.	ARMS 3109	Deep Dive Session 4	Pre-reading when assigned
4/24/2019	5:30-7:00 p.m.		Project Update 4	10-minute team presentation
5/3/2019	NO CLASS			Final Research Report (due 11:59 pm EST)

**All assignments are due at the beginning of class time/session on Blackboard unless otherwise specified

2019 FACULTY MENTORS

Team	MENTOR	SCHOOL	RESEARCH INTERESTS	GRAND ENGINEERING CHALLENGE FOCUS	
1	Jennifer DeBoer	Engineering Education	International engineering education; Education and economic development; educational technology; Online learning; Quantitative research methods.	Advance personalized learning	
2	Luciano Castillo	Mechanical Engineering	Renewable energy; Turbulence; Bioengineering; solar energy; microgrids; affordable energy; water security; energy security	Make solar energy economical	
3	John Lumkes	Agricultural & Biological Engineering	Controls, Electro-hydraulics & Design of Mobility Systems; development of controller algorithms, electronics, and actuator systems for machines, camless engines, and hybrid vehicles; Autonomous and drive-by-wire technologies for vehicles; Modeling and simulation; food security	Make solar energy economical Provide access to clean water	

TEXTBOOK/ REQUIRED READINGS

Texts and reading materials will be assigned and provided as needed through Blackboard. There is no expectation to purchase any texts for this course. You are expected to complete any pre-readings and assignments and to do a comprehensive literature review to support your project/poster.

ASSESSMENT

This course will include readings, pre-work, discussion, a poster, and one final paper. There is no final exam for this course. Point distribution:

- 20%   Attendance and Participation
- 30%   Research and Collaboration (including project updates, team performance reviews, etc.)
- 25%   Term Paper (individual)
- 25%   Poster and Poster Session Presentation (group work)

ATTENDANCE & PARTICIPATION (20%)

Discussion represents a major feature of this course. The attendance and participation points are divided by **attendance** (being on time and present in class) **and participation** (being engaged in the class). If you arrive more than 10 minutes late   or leave early, you will not receive attendance points for that date. To earn participation points, you must be   prepared to engage in discussion and be an active contributor to discussion/project updates. If you are doing things that are   disruptive to the class (e.g., sleeping, using a mobile device or laptop, working on homework for another   class) your participation points will be reduced or revoked for that day.

If you have a legitimate and documented excuse to be absent from class, the instructor(s) must be notified in advance. If your instructor determines that your absence will be excused, you will have the opportunity to do a make-up assignment. Failure to complete the make-up assignment by the due date will result in zero credit for participation on the date of absence.

RESEARCH AND COLLABORATION (30%)

Teamwork is a pivotal aspect of this course. Successful team performance depends on personal individual accountability. You are expected to jointly draft a team contract and respect the team's code of conduct, participation and communication expectations. You are also expected to engage in fruitful problem-solving and research collaborations throughout the semester; as well as to give each other valuable feedback throughout all project stages in order to achieve the desired deliverable.. The performance of each team member will also be assessed throughout the semester using team reviews (such as CATME). All team members are expected to participate in project updates and provide feedback to the other teams about their projects. Please refer to "equity and respect" under *course policies* for more information about the expected team member behavior in this course.

TERM PAPER (25%)

The term paper will be the only individual work you will do this semester; all of the other deliverables will be achieved via team work. For the term paper, you will expand on your team project and discuss additional Grand Challenges for Engineering which could be addressed with this project and/or how you would need to adapt the current project to make it work for another application and/or to a different country/region of your interest and explain how the application of your project will be different in this new setting and additional challenges/considerations you will need to take into account when implementing your project elsewhere.

POSTER AND POSTER PRESENTATION (25%)

The poster is an important deliverable of this course and will contain the summary of your research project/prototype. You and your team will present the poster at on-campus professional expos and symposiums and will be able to list it on your CV as you start building your career. You will be assessed both in the quality of the poster and in your ability to present the results during the professional/academic events. Poster guidelines will be posted on Blackboard.

COURSE POLICIES

EQUITY & RESPECT

Throughout the semester, we will be exploring cultural images. We will encourage you to examine your perspectives and values as individuals, engineers, students, and people situated in global culture. As we experience self-discovery and learn about one another, **we encourage everyone to strive for a classroom climate where differences are acknowledged, respected, and appreciated**. Our classroom must be open and hospitable to all members of the class, and we will strive to practice the attitudes and behaviors characteristic of globally competent engineers working on cross-cultural teams.

ACADEMIC DISHONESTY AND USE OF COPYRIGHTED/PUBLISHED MATERIALS

This course provides many opportunities to learn about yourself and from your peers. While much effort has gone into the design of this course, ultimately it is your responsibility to learn. You are expected to: (1) think critically about course content, challenge your

own beliefs, and work towards synthesizing ideas, (2) engage in class discussions, explain your insights and ask others to explain theirs, and work towards making persuasive and grounded arguments, (3) participate in course activities, (4) attend all classes, complete assignments on time, and come prepared for class, and (5) abide by Purdue's policy on scholastic conduct and academic integrity and Purdue's student guide for academic integrity.

> *Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, Student Regulations] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]*

Purdue's regulations regarding the use of copyrighted materials for educational and research purposes:
> *Students are expected, within the context of the Regulations Governing Student Conduct and other applicable University policies, to act responsibly and ethically by applying the appropriate exception under the Copyright Act to the use of copyrighted works in their activities and studies. The University does not assume legal responsibility for violations of copyright law by students who are not employees of the University.*

EXPECTED LEVEL OF WORK

You are expected to deliver high quality work that is turned in on time. High quality work means: active and thoughtful engagement in class discussions, coming to class prepared, and assignments that are grounded, well-argued, well-organized, clear, and engaging. You may collaborate on work, but must complete and submit independent assignments. Demonstrating high quality work will generally result in an "A" grade. If a situation arises that may impact your ability to succeed in this course it is your responsibility to notify an instructor as soon as you are aware of the problem or issue.

ACCESSIBILITY AND ACCOMMODATIONS

If you are a person with special circumstances that you believe will affect your class performance (e.g., visual, hearing, learning impairments) please let the instructor(s) know and provide him/her with the letter from the Dean of Students so that they can make appropriate accommodations for you. The Disability Resource Center web site is located here.

IN CASE OF EMERGENCY OR UNFORSEEN CIRCUMSTANCES

In preparation for the unlikely event of fires, tornadoes, or other hazards, please review the safety information posted in WALC and   on Purdue's emergency preparedness web site. In the event of a major campus emergency, course requirements, deadlines and   grading percentages may be subject to change. Changes in the course will be disseminated by Blackboard, and when appropriate   via e-mail.