VIRTUAL PERU: CROSS-CULTURAL ENGAGEMENT & STEM PROGRAM

ENGR 397: Global Engineering Culture and Society (3 credits)

May 10 – 28, 2021

Faculty team:

Weeks 1 – 1.5: Dr. Rachel Brennan (PSU, EnvE) and Dr. Juan Rodriguez (UNI)
rab44@psu.edu jrodriguez@uni.edu.pe

Weeks 1.5 – 3: Dr. Julio Urbina (PSU, EE) and Ing. José Oliden Martinez (UNI)
jvu1@psu.edu joliden@inictel-uni.edu.pe

Weeks 1 – 3: Jaime Prudencio (PSU, Spanish)
jug32@psu.edu

Course description: Students are engaged through an immersive global experience in this team-taught course that examines sustainable development challenges and opportunities in Latin America. Multidisciplinary cross-cultural teams of Penn State and Peruvian students work together on site-specific case studies surrounding food-energy-water nexus challenges in Peru. As a pivotal component of this course, students investigate the social, cultural, and economic issues critical to technical implementation projects, prior to learning the technical approaches themselves. Students thereby learn to approach engineering design challenges from a holistic perspective and develop leadership skills on an interdisciplinary platform, appreciating the imperative roles of scientific knowledge and cultural engagement in international development.

Learning objectives: At the conclusion of this program, students should be able to:

- (GS3) Describe how the UN Sustainable Development Goals relate to Peru;
- (GS5) Apply intercultural knowledge in communication scenarios connected to El Plan Bicentenario: El Peru hacia el 2021, and the US National Academies’ Grand Engineering Challenges;
- (GN1) Utilize a systems approach to define a technoscientific problem, and illustrate how a systems approach can be employed to devise sustainable engineering solutions that benefit specific communities, and humanity at large;
- (GN 2) Create conceptual designs for the sustainable production of nutritious food, renewable energy, and clean water in the context of site-specific challenges;
- (GN 4) Study sites in Peru which are confronted with food-energy-water challenges and analyze appropriate data to enable an assessment of feasible technologies;
- (GN5) Determine how to approach a technical problem from transnational and interdisciplinary perspectives, with an emphasis on Peru and Latin America.
Grading: Students' grades will be calculated as follows:

Module 1 (1.5 weeks) = 100 points
Module 2 (1.5 weeks) = 100 points
Spanish (3 weeks) = 200 points
Total = 400 points = 100%

The standard grading system will be used to assign final letter grades in the course (A = 94 – 100%; A- = 90 – 93%; B+ = 87 – 89%; B = 84 – 86%; B- = 80 – 83%; C+ = 76 – 79%; C = 70 – 75%; D = 60 – 69%; F = 0 – 59%).

Module 1 (Weeks 1 – 1.5): Sustainable Technologies for Water-Energy-Food Challenges

Module 1 Instructors: Dr. Rachel Brennan and Dr. Juan Rodríguez

Module 1 Summary: This module develops awareness of water-energy-food nexus challenges around the world, and enables to students to consider the nuances of culturally appropriate technical solutions to specific sites in Peru.

Objectives: i) (GN 5) Understand how water-energy-food nexus challenges relate to the UN Sustainable Development Goals; ii) (GN 4) Analyze local sites in Peru which are confronted with water-energy-food nexus challenges and collect appropriate data to enable an assessment of feasible technologies; iii) (GN 2) Create a conceptual design for the sustainable production of clean water, renewable energy, and/or nutritious food, in the context of site-specific challenges; and iv) Exercise writing skills effective for professional practice.

Evaluation:

In-class activities (3 @ 5 pts/ea) = 15 points
Homework (3 @ 5 pts/ea) = 15 points
Labs (3 @ 15 pts/ea) = 45 points
Report (1 @ 25 pts) = 25 points
Total = 100 points

Module 2 (Weeks 1.5 – 3): Collect Environmental Data

Module 2 Instructors: Dr. Julio Urbina and Ing. José Oliden Martinez

Module 2 Summary: The module will extend the UN Sustainable Development Goals to specific needs and applications in Peru, introduce the National Academy of Engineering Grand Challenges and the concept of Engineering for Humanity.

Objectives: (i) (GS 3) describe how the UN Sustainable Development Goals and associated engineering issues relate to Peru; (ii) (GS 5) Describe how the UN Sustainable Development Goals relate to Peru; (iii) (GN 1) approach a technical problem from transnational and interdisciplinary perspectives; and (iv) (GN 5) devise engineering solutions that benefit specific communities. Students will also learn how to learn “just in time” engineering tools like Mblock and Blynk to solve topics under the Smart Cities IEEE concepts.

Evaluation: Reports 1, 2, and 3: Students will present oral reports for the corresponding topic described in the table below. 20% each. Final Oral Presentation: Students will present ppt on the problem they chose (teams of 2 or 3) with solutions that include at least two elements of concepts/tools learned during the lectures and labs. 40%
### Module 0 Schedule:

<table>
<thead>
<tr>
<th>Dates</th>
<th>Subject</th>
<th>Assignment</th>
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</thead>
<tbody>
<tr>
<td>Class 0.1</td>
<td>(2 hours, Dr. Urbina) 10:15am to 12:15pm</td>
<td></td>
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<tr>
<td>Class 0.2</td>
<td>(2 hours) 2:15pm to 4:15pm</td>
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### Module 1 Schedule:

<table>
<thead>
<tr>
<th>Dates (Weeks 1 – 1.5)</th>
<th>Subject</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>May 12 (W):</td>
<td>Introduction to the Water-Energy-Food Nexus; Water: Resources, Treatment, &amp; Reuse</td>
<td>HW 1: Water</td>
</tr>
<tr>
<td>Class 1.1</td>
<td>(2 hours, Dr. Brennan) 10:15am to 12:15pm</td>
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<tr>
<td>May 12 (W):</td>
<td>Water: Water Purification Site Analysis</td>
<td>Lab 1: Water</td>
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<tr>
<td>Class 1.2</td>
<td>(2 hours, Dr. Rodriguez) 2:15pm to 4:15pm</td>
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<td>May 17 (M):</td>
<td>Energy: Renewable Resources</td>
<td>HW 2: Energy</td>
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<tr>
<td>Class 1.3</td>
<td>(2 hours, Dr. Brennan) 10:15am to 12:15pm</td>
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<tr>
<td>May 17 (M):</td>
<td>Energy: Solar Community Site Analysis</td>
<td>Lab 2: Energy</td>
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<tr>
<td>Class 1.4</td>
<td>(2 hours, Dr. Rodriguez) 2:15pm to 4:15pm</td>
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<tr>
<td>May 19 (W):</td>
<td>Food: Components of Sustainable Agriculture</td>
<td>HW 3: Food</td>
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<tr>
<td>Class 1.5</td>
<td>(2 hours, Dr. Brennan) 10:15am to 12:15pm</td>
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<tr>
<td>May 19 (W):</td>
<td>Energy: Renewable Energy for Agriculture</td>
<td>Lab 3: Food</td>
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<tr>
<td>Class 1.6</td>
<td>(2 hours, Dr. Rodriguez) 2:15pm to 4:15pm</td>
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### Module 2 Schedule:

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<th>Dates (Weeks 1.5 – 3)</th>
<th>Subject</th>
<th>Assignment</th>
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<tr>
<td>Class 2.1</td>
<td>(2 hours, Dr. Urbina) 10:15am to 12:15pm</td>
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<tr>
<td>May 24 (W):</td>
<td>Internet of Things Signal Acquisition using IoT concept and tools</td>
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<tr>
<td>Class 2.2</td>
<td>(2 hours) 2:15pm to 4:15pm</td>
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May 26 (M):
Class 2.3
(2 hours, Dr. Urbina)
10:15am to 12:15pm
Project Development

May 26 (M):
Class 2.4
(2 hours)
2:15pm to 4:15pm
Project Report

Attendance: Professional development is one of the goals of the Cross-cultural Engagement & STEM program and our time is limited. Thus, it is both expected and required that you attend each class and arrive on time. Attendance is mandatory and will be included in your final grade. Only confirmed emergencies, such as illnesses will be excused. Students must notify the faculty prior to class if you have such an emergency. If no excuse is submitted prior to the start of class, the absence is unexcused and no credit will be awarded for that day. Please note that participation is also graded through attendance.

Technology in the Classroom and Participation: The Cross-cultural Engagement & STEM program should be an active and engaging experience. Therefore, the use of personal technological devices during class is prohibited. This includes cell phones, laptops, tablets, smart watches and other personal devices. Failure to participate (including not paying attention due to distractions) will result in points deducted from your grade.

Academic Integrity: Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University’s Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Academic Adjustment/Accommodation: Penn State welcomes students with disabilities into the University’s educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides contact information for every Penn State campus. For further information, please visit Student Disability Resources website.

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines. If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Counseling and Psychological Services (CAPS): Many students at Penn State face personal challenges or have psychological needs that may interfere with interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations,
online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients’ cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

**Counseling and Psychological Services at University Park (CAPS):** 814-863-0395  
Counseling and Psychological Services at Commonwealth Campuses  
Penn State Crisis Line (24 hours/7 days/week): 877-229-6400  
Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

**Educational Equity / Report Bias:** Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the [Report Bias webpage](#).