



THE UNIVERSITY OF ARIZONA  
COLLEGE OF AGRICULTURE & LIFE SCIENCES  
COLLEGE OF ENGINEERING

**Biosystems Engineering**

## **Globalization, Sustainability and Innovation**

**BE/ENGR 452/552 (3 units)**

**Tue/Thu Spring 2021**

### **Description of Course**

Globalization, sustainability and innovation constitute the three principal forces that drive the world of the 21<sup>st</sup> century -- economically, politically, socially and culturally. Aimed at engineering and science students, the objective of the course is to foster among them global intelligence (or global smarts), defined as an inclusive and cross-disciplinary working knowledge of how the globe operates today – including: (1) How global infrastructures in communication, transportation and information technology have transformed how nations and corporations conduct business; (2) How nurturing sustainability ensures competitive advantage, while ignoring it imperils nations as well as the planet; and (3) How technological innovation is critical both in maintaining competitive advantage and in providing the essential sustainable solutions to many of our current global challenges. In a flat world, fostering global intelligence has become a vital component of a well-rounded engineering and science education.

### **Course Prerequisites**

Advanced standing

### **Course Co-requisites**

None

### **Instructor and Contact Information**

Dr. Joel Cuello, Professor of Biosystems Engineering

Department of Biosystems Engineering, Shantz Building, Room 507, 1177 E. \$th St.,  
The University of Arizona, Tucson, AZ 85721

TEL (520) 621-7757; CELL (520) 360-7688; [cuelloj@arizona.edu](mailto:cuelloj@arizona.edu)

Office Hours: TTh 2-3 PM or By appointment

## **Course Communications**

Students can communicate with instructor outside of class via email or telephone.

## **Course Format and Teaching Methods**

The course is taught through lectures, discussions, viewing of pertinent videos and student team presentations. The students, grouped in teams, work collaboratively on assigned projects for which they give team oral presentations in class as well as submit written team reports. The course fosters industry-style team work and collaboration. There are also homeworks and a midterm test that is given for individual work.

## **Course Objectives and Expected Learning Outcomes**

Aimed at engineering and science students, the objective of the course is to foster among them global intelligence (or global smarts), defined as an inclusive and cross-disciplinary working knowledge that enables them to understand and explain how the globe operates today – including:

- (1) How global infrastructures in communication, transportation, information technology as well as global business practices have transformed how nations and corporations conduct business;
- (2) How nurturing sustainability ensures competitive advantage, while ignoring it imperils nations as well as the planet; and,
- (3) How technological innovation is critical both in maintaining competitive advantage and in providing the essential sustainable solutions to many of our current global challenges

As expected learning outcomes, the students upon completing this course will be able to:

- (1) For graduate students -- identify a particular aspect of globalization, sustainability or innovation and explain in-depth how it works, operates and impacts people and societies around the world;
- (2) Identify and explain the roles of the enablers of economic globalization, including the internet, transportation, global communication, infrastructures, business practices, etc.;
- (3) Describe globally integrated enterprises and explain how they have engendered and continue to expand and deepen globalization;
- (4) Identify and describe the principal stakeholders of globalization and their respective roles;
- (5) Describe and explain how globalization could mean integration or segregation;
- (6) Identify and describe the outsiders of globalization, the threat they pose to the globalized world, and how such threat could be neutralized;

- (7) Explain environmental sustainability and how adopting sustainability strategies helps globally integrated enterprises and confer them with a competitive edge;
- (8) Define and explain corporate social responsibility;
- (9) Identify and describe sustainable innovations and technologies that are of benefit to globally integrated enterprises;
- (10) Identify and explain sustained innovation and disruptive innovation; and,
- (11) Explain how innovation is indispensable in sustaining both globalization and sustainability.

## Required Texts or Readings

Given that the subject matters of this course evolve quickly with current events and developments, there is not a required and set textbook for the course. However, the following foundational and canonical readings are recommended.

- (1) Anderson, C. 2006. *The Long Tail: Why the Future of Business is Selling Less of More*. New York: Hyperion Books.
- (2) Bhagwati, J. 2004. *In Defense of Globalization*. Oxford University Press.
- (3) Blinder, A.S. 2006. *Offshoring: The Next Industrial Revolution?* *Foreign Affairs*. March/April 2006.
- (4) Collier, P. 2007. *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It*. Oxford University Press.
- (5) Christensen, C.M., H. Baumann, R. Ruggles and T.M. Sadtler. 2006. *Disruptive Innovation for Social Change*. *Harvard Business Review*. December 2006. pp. 94-101.
- (6) Cuello, J.L. 2003. *Toward a New Global Ethic for Engineers*. *The Bent of Tau Beta Pi*. Summer 2003.
- (7) Cuello, J.L. 2006. *Offshoring and the Local Ethics of Engineers*. *The Bent of Tau Beta Pi*. Spring 2006.
- (8) Diamond, J. 2005. *Collapse: How Societies Choose to Fail and Succeed*. New York: Penguin Books.
- (9) Friedman, T.L. 2006. *The World is Flat*. 1st updated and expanded ed. New York : Farrar, Straus and Giroux.
- (10) Huntington, S.P. 1996. *The Clash of Civilizations and the Remaking of World Order*. New York: Simon and Schuster.
- (11) National Academies. 2005. *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Washington, D.C.: The National Academies.
- (12) Palmisano, J.P. 2006. *The Globally Integrated Enterprise*. *Foreign Affairs*. May/June 2006.
- (13) Porter, M.E. and M.R. Kramer. 2006. *Strategy and Society: The Link Between Competitive Advantage and Corporate Social Responsibility*. *Harvard Business Review*. December 2006.
- (14) Prestowitz, C. 2006. *Three Billion New Capitalists: The Great Shift of Wealth and Power to the East*. Basic Books.
- (15) Sachs, J.D. 2005. *The End of Poverty: Economic Possibilities for Our Time*. New York: Penguin Books.
- (16) Scheve, K.F. and M.J. Slaughter. 2007. *A New Deal for Globalization*. *Foreign Affairs*. July/August 2007.

## Optional and Recommended Readings

Additional current-events readings and their online links are provided each semester.

## Required Extracurricular Activities

None

## Assignments and Examinations: Schedule/Due Dates

The written midterm and final examinations are given in class. Homeworks are due typically a week after they are assigned, while team reports and the design project are typically due three weeks after they are assigned.

### Grading:

	<u>Undergraduate</u>	<u>Graduate</u>
Midterm:	15%	10%
Homeworks/Quizzes:	15%	15%
Team Reports:	35%	35%
Design Project:	20%	20%
Graduate Report*:		10%
Final Exam:	<u>15%</u>	<u>10%</u>
	100%	100%

\*Graduate Students' Report: Each graduate student will choose a relevant topic on globalization, sustainability or innovation, and conduct a more in-depth analysis of the subject matter. A 10-page written report is required.

## Grading Scale and Policies

### DETERMINATION OF CLASS GRADES:

Score	Grade
90-100%	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	E

**Requests for incomplete (I) or withdrawal (W)** must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading->

system#incomplete and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

### **Dispute of Grade Policy**

Students will have one week to dispute a grade on a project, quiz or exam.

## **Scheduled Topics/Activities**

### **I. Making Sense of Globalization**

1. Global Snap Shots: population; total children, total elderly; population in the next 50 years; global men's income; global women's income; living on up to \$10, \$20, \$50, \$100, \$200, >\$200 a day, etc.
2. The globally Integrated Enterprise: China as factory of the world; India as service center of the world; the U.S. as innovation center of the world
3. Media Consolidation and Web 2.0: Time Warner, News Corporation, CNN, Al-Jazeera, Google, Wikipedia, YouTube, My Space, etc.
4. The Major Actors in Globalization: Government, Corporations, and Civil Society
5. Is Globalization equal to Integration or Segmentation? The End of History, The Clash of Civilizations, and The Long Tail
6. Offshoring: pros and cons for the U.S.; engineers' ethics and rights
7. Going Global: The Fragile States and the Best Countries for Conducting Business

### **II. Creating a Start Button for Sustainability**

8. Ancient Environmental Collapse: Easter Island; the Mayas; Norse Greenland
9. Water: Global Shortage and Pollution
10. Soil: Desertification
11. Air: Global Pollution
12. The Amazon Rainforest: Deforestation
13. Global Warming: Kyoto Protocol and Carbon Trading
14. Global Oil Reserves and Biofuels
15. Global Food Production and Fair Trade
16. Solving Global Poverty: The End of Poverty and The Bottom Billion

### **III. Putting Innovation to Work**

17. Disruptive Innovation vs. Sustaining Innovation; Top Engineering and Science Innovations of the Last 20 Years
18. Measuring Innovation
19. Linking Competitive Advantage to Corporate Social Responsibility
20. Disruptive Innovation for Social Change
21. Innovation Ecosystem: creation, challenges and preservation

## **Absence and Class Participation Policy**

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>. Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

## **Threatening Behavior Policy**

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

## **Accessibility and Accommodations**

At the University of Arizona we strive to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, you are welcome to let me know so that we can discuss options. You are also encouraged to contact Disability Resources (520-621-3268) to explore reasonable accommodation. For additional information on the Disability Resource Center and reasonable accommodations, please visit <http://drc.arizona.edu>.

If our class meets at a campus location: Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

## **Code of Academic Integrity**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

<http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

*Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent.* Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

## **UA Nondiscrimination and Anti-harassment Policy**

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

### **Additional Resources for Students**

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>  
Student Assistance and Advocacy information is available at  
<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

### **Confidentiality of Student Records**

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

### **Subject to Change Statement**

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.