
**Engineering Excellence International Initiative
International Engineering Education Series
(I)**

Fundamentals of International Engineering

(64 Sessions)



**American Alliance for
International Education**

Version 2.0

American Alliance for International Education
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CATALOG DESCRIPTION

The Fundamentals of International Engineering course is offered as part of the Engineering Excellence International Initiative, a global engineering program that uses world class senior engineers from U.S. multi-national corporations to prepare engineering students for the new business paradigm of international collaboration. The Fundamentals of International Engineering is the first course offered by the initiative. Other courses in the initiative includes

- International Engineering Communications
- Invention, Innovation & Entrepreneurship

Universities interested in above courses should contact AAFIE for more information.

The Fundamentals of International Engineering provides an introduction to the international engineering professions, international engineering ethics, global engineering community, international engineering disciplines, international engineering processes, global engineering environment, sustainability, and related contents, with significant amount of time focusing on international engineering practices, case studies, the global impacts of engineering solutions, and global collaboration in international engineering projects.

Students are recommended to be grouped into classes based on their majors.

COURSE GOAL

The goal of the Fundamentals of International Engineering is to cultivate 21st century international engineers in obtaining a global perspective.

COURSE OBJECTIVES

Upon successful completion of this course, the student will be able to:

1. Understand the globalization of product development and engineering project in real world;
2. Describe and follow international engineering process;
3. Understand global collaboration of engineering projects;
4. Understand the global impacts of engineering solutions;
5. Be able to apply international engineering process to solve real world engineering problems;
6. Gain knowledge of collaboration with engineers from different cultures around the world;
7. Develop global perspective in product research and development.

PREREQUISITES

There are no prerequisites for engineering students to take the introductory course.

INSTRUCTORS

The course is taught by AAFIE Global Engineering Lecturers Group, a group of senior engineers from U.S. multi-national companies.

INSTRUCTION APPROACH

By leveraging the world's most advanced Internet video collaboration technology, the world-class engineering professionals and senior engineers from the United States give real-time lectures to engineering students, interact with the engineering students, and guide the engineering students in conducting international engineering projects.

Students will complete the entire coursework in the AAHED global learning community, a platform specifically designed to promote global perspective, cross-cultural communication, international collaboration, and critical and creative thinking skills. In the AAHED global learning community, students are guided by international mentors consisting of international senior engineers from multinational companies in the United States. Students need to submit their coursework to the global community, present their solutions to the global community, receive feedback from the global community, and complete their projects by discussing and interacting with the global community, making students learn in a real global context.

TEXTBOOKS

The course is mostly about real-world international engineering experience, therefore, there are no textbooks needed. Students will leverage Internet contents for project assignments and use live recorded sessions for class review.

COURSE CREDITS:

The recommended number of credits for the course is 3. To complete the course, a total of 64 lecture sessions is required. Students will have lectures twice a week, each lecture contains 2 sessions (45 minutes/session).

COURSE GRADING POLICY

Classroom Participations/Responses: 20%
Team Work: 20%

Project/Research Reports: 30%
Exams: 30%

COURSE OUTLINE

Unit 1: The Globalization of Engineering

1.1 The Globalization of Engineering Case Studies

- Boeing 787 - Global Collaboration
- GM's Global Innovation Center
- Silicon Valley
- Others

1.2 Global Collaboration & Innovation

Unit 2: Multinational Company Structures

2.1 Three Components

2.2 Functional Structures

2.3 Case Studies

- General Motors
- Ford
- Boeing
- Apple Computer

Unit 3: Introduction to International Engineering Disciplines and Professions

3.1 International engineering disciplines

3.2 Global competency for engineers

3.3 Cross-cultural collaboration

3.4 Global leadership

3.5 Global engineering management

3.6 Global professional engineer licensure

Unit 4: International Engineering Process

4.1 Global Engineering Process

4.2 Problem Identification

4.3 Research

4.4 Requirements Specification

4.5 Concept Generation

4.6 Design

4.7 Prototyping

4.8 System Integration

4.9 Maintenance

4.10 Discussion

- Global engineering challenges

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- Global requirements & impacts
 - Problem solving methodology in a global context
 - Performance, functionality, and reliability
 - Energy concern
 - Global engineering constraints (Economic, Environmental, Ethical and Legal, Health and Safety, Manufacturability, Political and Social, Sustainability)

Unit 5: International Engineering Solutions

- 5.1 Engineering Decision
- 5.2 Global Stake-holders for Engineering Solutions
- 5.3 International Engineering Economics
- 5.4 Social, Human Life, and Environmental Impacts

Unit 6: International Engineering Ethics & Practice

- 6.1 Global engineering regulations
- 6.2 Global engineering code of ethics
- 6.3 Global engineering legal responsibilities

Unit 7: International Engineering Innovation

- 7.1 International engineering innovation process
- 7.2 International engineering innovation approach
- 7.3 International engineering license, patents, & intellectual property

STUDENT PROJECT ASSIGNMENT

Under the guidance of U.S. senior engineers, students will apply the fundamental principles of international engineering to solve a real-world engineering problem by following the real-world international engineering process in the broad context of engineering design, considering global market, problem definition, conceptual design, design evaluation, detailed design, technical analysis, manufacturability evaluation, and economic feasibility.

Project Notes:

- (1). Problem statement is dependent on students' majors.
- (2). Students must form a team of 5 members and develop decision making guidelines for roles and responsibilities, member opinion, and consensus.
- (3). Students must follow international engineering process for the entire project.
- (4). Important guidelines:

A. No single "correct" solution: Students' solutions should be in a way that is best for customers (international market needs) and for the "company" (profitability).

B. Students' solutions should take the following global constraints into consideration:

- Economic
- Environmental
- Ethical and Legal
- Health and Safety
- Manufacturability
- Political and Social
- Sustainability

C. Students should "sell" their ideas to their team members and to arrive at solutions, and then "sell" the solutions to their mentors in the AAHED global community, during which students will be asked questions in defense of their proposals.

GENERAL ASSESSMENT

The following is a list of general assessments for all international engineering courses offered in the Engineering Excellence International Initiative:

- 1. Technical Skills:** Students achieve global competency to pursue the full range of careers for all pathways in the program concentration.
- 2. Communications:** Students use various communication skills in expressing and interpreting engineering information.
- 3. Problem Solving and Critical Thinking:** Students define and solve engineering problems from global perspective, and use internationally recognized problem-solving and improvement methods and tools.
- 4. Information Technology Applications:** Students use the latest technologies to access, organize, process, transmit, and communicate engineering information.
- 5. Systems:** Students understand a variety of structures and functions in global engineering fields.
- 6. Leadership and Teamwork:** Students apply international leadership and teamwork skills in collaborating with others to accomplish goals and objectives.
- 7. Ethics and Legal Responsibilities:** Students commit to work ethics, behavior, and legal responsibilities in global engineering fields.

8. Innovation Skills: Students come up with engineering solutions in innovative ways

9. Entrepreneurship: Students demonstrate understanding of concepts, processes, and behaviors associated with international engineering projects and successful entrepreneurial performance.