

COURSE SYLLABUS

ISE445/ENGR445: Principles and Practices of Global Innovation (Previously ISE 545: Technology Development and Implementation)

Fall Semester, 2024

Dr. Chu-Yi Wang

Industrial and Systems Engineering Department

Office: Denney Research Center (DRB) 260

Email: chuyiwan@usc.edu

Course Section:	31521D (on-campus) 31721D (off-campus)
Course Unit:	4 Units
Prerequisite:	A graduate student standing in engineering is required (or with a special approval by the instructor).
Class Hours:	Tuesdays, 5:00 pm to 8:20 pm* <ul style="list-style-type: none">• 5:00 pm to 5:30 pm – Warmup & Review• 5:30 pm to 5:40 pm – session break• 5:40 pm to 7:00 pm – In-Class Exercises & New Material Preview• 7:00 pm to 7:10 pm – session break• 7:10 pm to 8:20 pm – Pre-recorded Lecture* / Office Hours * This is a flipped classroom- students can watch the weekly pre-recorded lecture at any time within a week.
Class Location:	Ronald Tutor Hall (RTH) 217
Office Hours:	7:10 pm to 8:20 pm, on Tuesdays @RTH 217 Email request is required for the appointments out of the office hour window <ul style="list-style-type: none">• Zoom: https://usc.zoom.us/my/drwang• The email is usually replied within 48 hours
Teaching Assistant:	Hank Kim <ul style="list-style-type: none">• Email: hankyulk@usc.edu• Office Hours: TBD

Course Introduction:

Global innovation is a socio-technical subject that requires innovators to have both “content knowledge” and “contextual understanding” of the undertaking to be successful in competitive global markets. The “content” is domain facts, theories, and principles that enable innovators to find the right innovation solutions, while the “context” refers to those cultural factors and social norms that guide innovators to discover good innovation opportunities in the first place. The former can be learned through courseware and classroom lectures, whereas the latter must be acquired through interactions with stakeholders (e.g., innovators).

In this course, students will learn both the content (i.e., principles) and the context (i.e., practice) of technology innovation in competitive global markets. It will focus on how customer needs and market trends are shaped by various social and cultural contexts, which, in turn, drive different innovation opportunities and strategies. A socio-technical innovation paradigm will be used to study key concepts and principles that govern the dynamic lifecycle of product innovations in the early, mainstream, and late markets. Different competition strategies at each market stage will also be explained. Real-world examples and case studies of technology products on consumer markets will be included for students to gain more insights into global innovation practices.

Upon the completion of this course, students will not only learn content information about innovation principles but more importantly, develop contextual knowledge of innovation practices.

Learning Modules:

The course is organized in the following 11 learning modules (Chapters), each will be delivered in a pre-recorded lecture and reviewed/practiced in a live class.

1. The big picture: Characteristics of innovation and product development
2. The big picture: Characteristics of open technological innovation in competitive global market
3. The S-Curves: the lifecycle of technological innovations with market competitions
4. The early market: discover unmet demands and choose functional requirements
5. The early market: battle for the dominant standard to cross the market chasm
6. The mainstream market: rational competition to irrational hyper-competition
7. The mainstream market: the Segment-Zero principle of market competitions
8. The late market: use performance surplus to perform product modularization
9. The late market: use global outsourcing to survive technology commoditization
10. Breakthrough innovation: how to create new products for a blue-ocean market?
11. Summary and Review

Reading Materials:

There is no required textbook for this course, and some recommended reference books include:

- *“Product Design and Development”* (3rd edition), by Karl Ulrich and Steven Eppinger, the McGraw-Hill Irwin Company.
- *“Product Ideas to Product Success”*, Matthew Yubas, Broadword Publishing, Inc.
- *“Product Design – Techniques in Reverse Engineering and New Product Development”*, by Kevin Otto and Kristin Wood, Prentice Hall
- *“Creating Breakthrough Products – Innovation from Product Planning to Program Approval”*, by Jonathan Cagan and Craig M. Voget, Prentice Hall
- *“Strategic Management of Technological Innovation”*, by Melissa A Schilling, the McGraw-Hill Irwin Company
- *“Strategic Management of Technology and Innovation”*, (3rd edition), by Robert A. Burgelman, Modesto A. Maidique, and Steven C. Wheelwright, the McGraw-Hill Irwin Company.
- *“Business Planning and Market Strategy”*, by Erhard K. Valentin, SAGE Publications.
- *“The Mechanical Design Process”* (3rd edition), David G. Ullman, the McGraw-Hill Companies, Inc.

The instructor may recommend additional reading materials and website reference resources during the semester whenever appropriate.

Course Website:

Students’ learning of this course is supplemented by a course website/webtool on Microsoft Teams (<https://teams.microsoft.com/>). All registered students have access to this website (Fall 2024 - ISE445/ISE-545). Students should browse the entire site to familiarize themselves with the various areas and functions.

Lecture Format:

This is a flipped-classroom course. Each learning module is executed as follows:

- On Tuesday, lecture notes and a pre-recorded video are posted on course website for students to pre-study the lecture content.
- Students post their feedback on the course content (such as questions, insights, relevant examples, etc.) on the course website before the end of Sunday.
- Dr. Wang reads students’ feedback and prepare for the live class.
- During Tuesday class time, Dr. Wang holds review, exercise, and preview sessions to address students’ possible problems, to provide supplemental materials, to emphasize important concepts, and to guide to the next module.
- Dr. Wang holds office hours at the classroom after the live class for students to ask questions.
- Dr. Wang provides four quizzes (non-graded, answers will be provided) correlated to the four sets of lectures divided from the learning modules for students to check their understanding of the core concepts:

Q1. The big picture and S-curve

- Q2. Early market
- Q3. Mainstream market
- Q4. Late market

Course Grading:

Students will be graded according to the following scheme:

- 10% -- Participation
 - (10%) Discussion board posts (M1-M10, 1% for each module)
- 40% -- To understand core concepts
 - (40%) Final Examination
- 20% -- To broaden students' exposure to relevant fields
 - (20%) Case Study Report
- 30% -- To learn by doing and collaboration
 - (10%) Innovation Project (Progress report)
 - (20%) Innovation Project (Final report and Presentation)

Discussion board posts (10%)

Students are required to submit their feedback of each learning module on the corresponding discussion board on Microsoft Teams **before the live class**. This is an important check-point for the instructor to know students' learning efficiency and to prepare for her live class lecture. The post could be questions regarding the lecture, your insights, real-world examples, or any related content.

This assignment is considered as a participation, so students earn the full credits as long as they post their feedback before each deadline.

Final Exam (40%)

The final exam follows school's calendar- 4:30-6:30 p.m. on Dec. 17th. The exam will be held via Microsoft Teams, and both On-campus and DEN students are required to take the exam at the same time at your own place.

It is an open book exam and limited to the materials that have been covered in M1-M11 lectures. Questions may be open-ended but are made brief and point specific as much as possible. They often require only short answers that show your comprehension of the concepts, definitions, approaches, and tools covered.

Case Study Report (20%)

Case study is a very important means of learning for inter-disciplinary subjects, such as Principles and Practices of Global Innovation, whose knowledge links directly to industrial cases and practices. This case study assignment is designed to help students apply learnt knowledge to a practical case and broaden their exposure to relevant fields. Students are asked to study the assigned article, find a target company/product (case), and then use the ISE445/ENGR445: Principles and Practices of Global Innovation (Chu-Yi Wang, Fall 2024)

theories/questions to diagnose/analyze the case and to give a recommended action plan. If possible, students are encouraged to employ those theories and models discussed in the class to support their case study reports. The case study report should be **up to 10 pages** in length (including references), 12 pt., typewritten, double-spaced, with maximum 1" margins. The report should be organized with (as grading rubrics):

- a succinct summary of the assigned article (10%),
- a short introduction of the case (10%)
- your diagnosis/analysis of the case (30%)
- the recommended action plan (30%), and
- the conclusion (10%).
- (The remaining 10% is the report **format**.)

Team Project (10% Progress report, 10% Final presentation and 10% Final report)

This class emphasizes the importance of learning by doing, the team project assignment aims to help students understand the methods and important concepts taught in class by practice. The assignment is throughout the semester, and two milestones are set to check students' learning. Students must follow the instructions to analyze the product, develop a new product, and strategize the product's lifecycle plan. Peer evaluation will be applied to adjust the project grades for each student.

Scenario: Each team is a global company, which sells a product in the U.S. Team members will elect a CEO* to lead the team. Each team will give a holistic analysis of a product and write in a report (progress report, template will be provided). Then, based on their analysis, each team develop 2nd and 3rd generations of the product to sustain their business, and they will present their new products and strategies in a form of report (final report) and an oral presentation (final presentation).

* CEO (i.e., the team leader) will received 1% of semester grade as a bonus credit for their contribution to execute the project.

Grading Scale

Course final grades will be determined using the following scale

A	91%-100%
A-	86%-90%
B+	81%-85%
B	76%-80%
B-	71%-75%
C+	66%-70%
F	65% and below

Late Assignments

Late Assignments are accepted for the case study report and project reports, but they are with the following

deductions. Do not wait until the last minute to upload. Unless there an emergency (in which case exceptions will be made) late assignments will have the following grades.

- 1 second to 5 minutes after deadline: -1% of assignment grade
- 5 minutes to 24 hours after deadline: -10% of assignment grade
- 24 to 72 hours after deadline: -25% of assignment grade
- 3 to 7 days after deadline: -50% of assignment grade
- More than 1 week after deadline before the final exam day: -75% of assignment grade

Please note that all emergency situations will require documentation (doctors note, police report, etc.). Losing internet access or power outages do not classify as an emergency. (Be sure to submit before the deadline to account for things like internet outages.)

Course Schedule:

A tentative course schedule, which includes weekly learning subject and activities, is as follow. The instructor reserves the right to change this schedule during the semester to better fit students' learning needs and progresses.

Week	Class Date	Learning Subject	Due/Activities
1	08/27	Course Introduction (+ M1 Self-paced study)	<ul style="list-style-type: none"> • Watch M1 video • Post to Team's M1
2	09/03	M1. Big Picture- Innovation and Product Development	<ul style="list-style-type: none"> • Watch M2 video • Post to Team's M2
3	09/10	M2. Big Picture- Innovations in Global Market <ul style="list-style-type: none"> • Case Study and Team Project are assigned in class 	<ul style="list-style-type: none"> • Watch M3 video • Post to Team's M3
4	09/17	M3. Big Picture- S-curve and Technological Innovations	<ul style="list-style-type: none"> • Watch M4 video • Post to Team's M4
5	09/24	M4. Early Market- Unmet Demands and Functional Target	<ul style="list-style-type: none"> • Watch M5 video • Post to Team's M5
6	10/01	M5. Early Market- Battle of Dominant Design	<ul style="list-style-type: none"> • Watch M6 video • Post to Team's M6
7	10/08	M6. Mainstream Market- Hyper Competition	Progress Report (10/12) <ul style="list-style-type: none"> • Schedule Consultation
8	10/15	Project Consultation Week	<ul style="list-style-type: none"> • Watch M7 video • Post to Team's M7
9	10/22	M7. Mainstream Market- Strategies and Trends	<ul style="list-style-type: none"> • Watch M8 video • Post to Team's M8
10	10/29	M8. Late Market- Performance Surplus and Modularization	<ul style="list-style-type: none"> • Watch M9 video • Post to Team's M9

11	11/05	M9. Late Market- Global Outsourcing and Commoditization	<ul style="list-style-type: none"> • Watch M10 video • Post to Team's M10
12	11/12	M10. Breakthrough Innovation- Emerging Innovations	<ul style="list-style-type: none"> • Schedule Consultation
13	11/19	Project Consultation Week	
14	11/26	M11. Summary and Review	Final Report (11/30)
15	12/03	Project Final Presentation	Case Study (12/07) Peer Evaluation (12/07)
16	N/A	Study Week (No Class)	
17	12/17	Final Exam: 4:30-6:30 p.m, Dec. 17th	Final Exam (12/17)

Academic Integrity:

"The Viterbi School of Engineering adheres to the University's policies and procedures governing academic integrity as described in SCampus. Students are expected to be aware of and to observe the academic integrity standards described in SCampus, and to expect those standards to be enforced in this course."

Students with Disabilities:

Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213)740-0776.