

IE546: ECONOMIC DECISIONS IN ENGINEERING

Spring 2021, TTh 4:30 – 5:45 PM (ET)

Physical Lectures Location: Wang Hall 2555

Live Lectures on Zoom:

<https://purdue-edu.zoom.us/j/94675317437?pwd=REZIMkkzR21xVU1SY0d6c3B4dHMvQT09>
(Meeting ID: 946 7531 7437, Passcode: 438420)

Lecture recordings to be uploaded to Brightspace, under Course Tools\Kaltura Media Gallery (lecture videos should be available within 24 hours, unless the Kaltura system is down)

Instructor: Dr. Andrew (Lu) Liu

Email: andrewliu@purdue.edu (Note that liu334@purdue.edu is ALSO my email address. You do NOT need to email me the same message to both addresses.)

Office Hours (Online only): Mon. and Wed.: 2:45 – 3:45 PM (ET)

Office-hour Zoom meeting:

<https://purdue-edu.zoom.us/j/93127498991?pwd=WWJIVy9uRGk5aXl4VTN0a0YxcHJmUT09>
(Meeting ID: 931 2749 8991, Passcode: 251901)

Teaching Assistants:

Akash Agarwal Email: agarwa67@purdue.edu Office Hours (online only): Tue. and Thur. 11:30 AM – 12:30 PM (ET) Zoom link: https://purdue-edu.zoom.us/j/97367760699?pwd=ZCs2VWMybkRzalc0Sk9Zd1BaVENZdz09	Fang Chen Email: chen1427@purdue.edu Office Hours (online only): Fri.: 10 – 11 AM (ET) Zoom link: https://purdue-edu.zoom.us/j/4127386462
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COVID-19 Safety Measures

- ***Enter and exit the classroom:*** Maintain appropriate social distancing when entering and leaving the classroom. **Follow all directional signage.**

- **Everyone must wear a face mask to enter and remain in the classroom.** (If you have conditions that prevent you from wearing a face mask, please email the instructor IMMEDIATELY.)
- Do not eat or drink in the classroom. Anyone needing to eat or drink must leave the classroom to do so.
- Always **maintain social distancing** between the instructor and students, and between students, both IN and OUTSIDE of the classroom.
- Sanitizing supplies are provided in the classroom by the university. Dispose of the wipes and other cleaning materials in the trash receptacle.
- **Do not come to class if you feel ill, have a fever, or display any symptoms associated with COVID-19.** Any student or instructor who has symptoms associated with COVID-19 (outlined on the Protect Purdue Pledge card) must contact the Protect Purdue Health Center (765-496-info).
- Please inform the instructor immediately if you attend the lectures IN PERSON and are tested positive of COVID-19. (I will inform you if I test positive.) In-person lectures will be suspended for two weeks as soon as one student or the instructor (who attends lectures in person) is tested positive.

Course Objectives – We will learn decision making and rationality, including decision analysis; decision making under uncertainty; various descriptive and prescriptive models from operations research, economics, and business. Applications are drawn from engineering decision-making, public policy, and personal decision-making. Attention is also paid to designing aids to improve decision-making. Use of risk analysis software is optional (not required).

Brief Course Description – Classical decision theory, deterministic decision rules, decision trees, influence diagrams, single/multiple stage analysis, sensitivity analysis; subjective probability, heuristics and biases, Bayesian methods, conjugate belief forms, inference, belief assessment methods, value of information, legal reasoning, risk analysis; utility theory, risk aversion, conflicting objectives, multi-attribute decision theory, analytic hierarchy process.

Textbook Book (required) – Robert T. Clemen. *Making Hard Decisions: An Introduction to Decision Analysis*, 2nd edition, Duxbury Press. (A used copy is more than enough.)

Reference Book (not required)

- Ronald A. Howard and Ali E. Abbas. *Foundations of Decision Analysis*. Pearson Higher Ed, 2015.
- Hammond, John S., Ralph L. Keeney, and Howard Raiffa. *Smart Choices: A Practical Guide To Making Better Decisions*. Harvard Business Review Press, 2015.
- **Reference book on probability – Sheldon Ross. *First Course in Probability*. (Does not matter which edition you use.)**

Grading –

Homework:	40%	Submission through Gradescope
Exam 1:	20%	3/3/2021
Exam 2:	20%	4/7/2021
Exam 3:	20%	5/5/2021

All exams will be open everything, but with time limits. The time of the exams is only an estimation; I will confirm with the class as soon as the dates are firmed up. Note that the last exam is NOT a final exam; all exams weigh equally.

Grading Scale (not on a curve) –

A [85, 100]
B [70, 84]
C [55, 69]
D [45, 54]
F < 45

Tentative Course Outline

- Week 1-5 Classical decision theory: deterministic decision rules, influence diagrams, decision trees, single/multiple stage analysis, sensitivity analysis. Book chapters: 1, 2, 3, 4, 5
- Week 6-11 Probability basics, subjective probability, heuristics and biases, Bayesian methods, conjugate belief forms, inference, belief assessment methods, value of information, risk analysis. Book chapters: 7-10, 12
- Week 12-16 Utility theory, risk aversion, conflicting objectives, multi-attribute decision theory, analytic hierarchy process. Book chapters: 13 -16

Reading Days and Class Cancellation

- 3/18 (Thursday) (the University Reading Day) – Zoom meeting only
- 3/23 (Tuesday) – no class
- 4/13 (Tuesday) (the University Reading Day) – no class

COURSE POLICIES

- **Attendance.**

○ The first two lectures (1/19, Tue. and 1/21, Thu.) will be **STRICTLY ONLINE**.

○ After that, you have the COMPLETE freedom to either attend the lectures in-person or online. (Of course you can switch freely as well; no need to let me know.) If you cannot join the class at the scheduled time, video recordings will be available on Brightspace (under \Course Tools\Kaltura Media Gallery).

- **Academic Dishonesty.** You can consult with your peers on homework assignments. However, you MUST do the homework by yourself. For exams, you have to work ON YOUR OWN. Copies of suspicious homework/exam submissions will be directly sent to the Dean's office.

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, [University 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]

- **Grief Absence Policy for Students.** When absences of legitimate reasons are anticipated, students should inform the instructor of the situation as far in advance as possible.

Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for misses assignments or assessments in the event of the death of a member of the student's family.

- **Violent Behavior Policy.**

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

- **Students with Disabilities.**

Purdue University is required to respond to the needs of the students with disabilities as outlined in both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 through the provision of auxiliary aids and services that allow a student with a disability to fully access and participate in the programs, services, and activities at Purdue University.

If you have a disability that requires special academic accommodation, please make an appointment to speak with me within the first three (3) weeks of the semester in order to discuss any adjustments. It is important that we talk about this at the beginning of the semester. It is the student's responsibility to notify the Disability Resource Center (<http://www.purdue.edu/drc>) of an impairment/condition that may require accommodations and/or classroom modifications.

- **Emergencies:** I will contact you using Brightspace's Email list in case of emergencies.

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

EMERGENCY NOTIFICATION PROCEDURES are based on a simple concept – if you hear a fire alarm inside, proceed outside. If you hear a siren outside, proceed inside.

- Indoor Fire Alarms mean to stop class or research and immediately evacuate the building – Proceed to your Emergency Assembly Area away from building doors. Remain outside until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

- All Hazards Outdoor Emergency Warning Sirens mean to immediately seek shelter (Shelter in Place) in a safe location within the closest building. – “Shelter in place” means seeking immediate shelter inside a building or University residence. This course of action may need to be taken during a tornado, a civil disturbance including a shooting or release of hazardous materials in the outside air. Once safely inside, find out more details about the emergency*. Remain in place until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

*In both cases, you should seek additional clarifying information by all means possible...Purdue Home page, email alert, TV, radio, etc...review the Purdue Emergency Warning Notification System multi-communication layers at http://www.purdue.edu/ehps/emergency_preparedness/warning-system.html

EMERGENCY RESPONSE PROCEDURES: Review the Emergency Procedures Guidelines https://www.purdue.edu/emergency_preparedness/flipchart/index.html

EMERGENCY PREPAREDNESS AWARENESS VIDEOS

Last Updated: 03/01/2021

- "Shots Fired on Campus: When Lightning Strikes," is a 20-minute active shooter awareness video that illustrates what to look for and how to prepare and react to this type of incident. See: https://www.youtube.com/watch?v=5mzI_5aj4Vs

MORE INFORMATION: Reference the Emergency Preparedness web site for additional information: http://www.purdue.edu/emergency_preparedness