

## **AE 505 – Appraisal of Engineering Projects under Uncertainty (Spring 2022)**

### **Course Introduction**

AE 505 – Appraisal of Engineering Projects under Uncertainty – will provide an appraisal methodology for large, complex, and long-term engineering projects such as the research and development (R&D) of Aerospace Systems and the construction of huge infrastructure. Lectures will cover 1) fundamentals of probability and risk assessment, 2) decision analysis, 3) cost-benefit analysis and integrated project appraisal framework. In parallel to the lectures, students will have opportunities to apply the knowledge learned in class to realistic situations through case studies.

AE 505 is designed as a graduate-level course for students who are interested in the analysis and planning of engineering projects from the financial and risk viewpoints. Undergraduate and graduate students from all majors who are interested in the subjects are encouraged to register in this course. There are no formal prerequisites to this course.

### **Learning Objectives**

After completion of this course, students shall have obtained the capability for appraisal and planning of engineering projects. In particular, they shall have gained understanding of 1) uncertainty identification and modeling, 2) assessment and management of uncertainty, 3) utility theory, 4) decision making with risk aversion, 5) cost and benefit analysis, and 6) integrated project appraisal framework, in the context of large / complex engineering system projects.

**Lecture Time / Lecture Room:** 9 – 10:30 am (Monday and Wednesday), N7-2202

**Instructor:** Jaemyung Ahn (X-3730, [jaemyung.ahn@kaist.ac.kr](mailto:jaemyung.ahn@kaist.ac.kr))

**Textbook:** D. Newman, T. Eschenbach, and J. Lavelle (2017). Engineering Economic Analysis (13<sup>th</sup> Ed.), Oxford University Press

(Amazon Link: [https://www.amazon.com/Engineering-Economic-Analysis-Donald-Newnan/dp/0190296909/ref=sr\\_1\\_2?dchild=1&keywords=engineering+economic+analysis&qid=1610522406&sr=8-2](https://www.amazon.com/Engineering-Economic-Analysis-Donald-Newnan/dp/0190296909/ref=sr_1_2?dchild=1&keywords=engineering+economic+analysis&qid=1610522406&sr=8-2))

**Credits:** 3 (3:0:3)

## **Lecture Schedule (As of January 2022)**

Week 1	Course Introduction, Probability Review
Week 2	Probability Review (Continued)
Week 3	Uncertainty Modeling
Week 4	Risk Analysis
Week 5	Risk, Issue, Opportunity (RIO) Management
Week 6	Quiz #1, Introduction to Decision Analysis
Week 7	Decision Tree 1
Week 8	No Lecture – Midterm Period
Week 9	Rationality/Utility
Week 10	Utility (Continued)
Week 11	Multi Attribute Utility, Quiz #2
Week 12	Introduction to Valuation Framework, Time Value of Money
Week 13	Decision Criteria, Considering Uncertainty
Week 14	Cost Modeling, Valuation of Public Projects
Week 15	Case Study
Week 16	Final Exam