

INTERNATIONAL UNIVERSITY OF JAPAN  
Public Management and Policy Analysis Program  
Graduate School of International Relations

**DCC5350/ADC5005 (2 Credits)**  
**Public Policy Modeling**  
Spring 2018

Classroom: C-201 Time: 10:30-12:00 Wednesday/Thursday <a href="http://www.sonsoo.org/policy/modeling/">http://www.sonsoo.org/policy/modeling/</a> Office Hour: 13:30-14:30 (Wednesday)	Instructor: Hun Myoung Park Office: 311 Telephone: (025) 779-1464 E-mail: <a href="mailto:kucc625@iuj.ac.jp">kucc625@iuj.ac.jp</a>
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**Prerequisites:** Students are expected to have basic knowledge of college level statistics (statistical inferences and probability theory), (matrix) algebra, and some calculus, which are addressed in *Statistical Methods* (DCC5220) and *Data Analysis for Public Managers* (DCC5380).

## INTRODUCTION

This Public Policy Modeling is a policy analysis course that employs mathematical and statistical methods to analyze policy issues. Public managers should be able to analyze various public issues logically and systematically and be equipped with tools (methods) and skills to support such scientific reasoning. This policy analysis course introduces the cost benefit analysis (CBA) concept and then explores mathematical and statistical methods that are frequently used in public policy and management. The emphasis here is given to “modeling” or a *scientific way of thinking* about policy and management problems rather than specific methods, techniques, and skills.

Students are trained to improve their abilities to identify and analyze policy problems correctly; formulate policy problems properly; and interpret results professionally. Students are also asked to present results professionally in order to successfully communicate with audience (senior managers and citizens) who do not know modeling and mathematics much. Fundamental concepts in policy modeling play a role of a common language that is shared by people from various disciplines. As future policy analysts, students need to recognize the “client oriented” nature of policy analysis.

Like management science or operations research class, this course includes linear programming (LP), decision analysis, Markov model, and queueing model that are commonly used in policy analysis and management. But this course excludes not only nonlinear programming, regression, and forecasting that can be covered in econometrics, public finance and budgeting, or time series analysis, but also variants of LP and inventory management models that are more often used in the business sector. This course minimizes burdensome technical details like LP’s simplex method and instead focuses on understanding and application of individual models.

In fact, it is unlikely, due to the nature of “publicness” in the public sector, that all aspects of individual models are directly applied to actual policy problems. However, their core concepts and logics provide important implications for policy analysis and management in both public and private sectors. Therefore, this modeling course is to improve students’

understandings of such concepts and logics and thus improve their ways of thinking for their future career.

At the end of semester, students should be able to:

- Understand basics of policy analysis,
- Understand ideas and natures of policy modeling,
- Understand key concepts and techniques of individual modeling methods,
- Understand linear programming (LP), decision analysis, Markov model, and queueing model,
- Able to formulate policy problems properly given their specific situations,
- Able to solve policy problems using computer software packages like Excel and Stata,
- Able to interpret and present results correctly and substantively, and
- Recognize strengths and limitations of policy modeling approaches.

Related courses include *Public Finance and Budgeting* (DCC5370) that includes forecasting techniques and *Cost Benefit Analysis* (ADC6765) of the Graduate School of International Relations.

## CLASS ORGANIZATION

This course is based on a series of lectures and labs, but students are encouraged to participate in class actively. Students are recommended to take advantage of discussing with the instructor.

## ASSESSMENT (COURSE REQUIREMENT)

There is no difference in this course (with respect to assessment, grading, and others) between DCC5350 and ADC5005 and between first year and second year students.

**Attendance (5%):** Students should attend ALL classes and labs. Each unexcused absence results in ONE POINT (1%) deduction. Students who missed 30 percent (or more) of class MAY NOT pass this course.

**Participation in Class (Extra credit):** Students are expected to actively participate in class. Extra credits will be awarded for outstanding performance and participation in class and/or exams.

**Quiz and reading assignment (25%):** Students must read required readings before the class. There will be 7 quizzes at the start of the class. Students have to answer two or three questions about the required readings. These quizzes are closed-book and closed-notebook tests. The instructor will prepare a question and answer sheet. Ten points are assigned to a correct answer; 8 for answer with minor mistake or misunderstanding; 5 for a partial answer; 2 for an incorrect answer with misunderstanding; and 0 for no answer.

**Exams (70%):** There will be *in-class* mid-term (35%) and final exams (35%). These exams will respectively cover the topics and materials of the first 4 weeks and later 6 weeks. Both exams are in the open-book and open notebook formats; you MUST bring the textbook.

Both midterm and final exams will be videotaped by OAA pursuant to the IUJ Examination Guidelines. Students must be aware of the guidelines before the exams.

**How To Study Effectively?** Students are expected to (1) read required readings (textbook) before the class, (2) listen to instructor's lecture and other classmates' opinions carefully in the class, (3) participate discussion actively in the class, (4) read handouts and required readings after the class, (5) ask questions to the instructor, and (6) solve old homework and exam questions before the exams.

## GRADING

The final grade is based on a composite of course requirements mentioned above. Their weights are:

- (1) Midterm exam 35%
- (2) Final exam 35%
- (3) Quiz 25%
- (4) Class attendance 5 points
- (5) Extra credits up to 10 points.

\* Extra credits will be awarded to students who actively participate in class (e.g., good questions and answers) and/or show excellent performance in exams. For example, extra credits will be given to those who answer correctly when most students fail to hit the right answer.

In short, your final score is calculated as  $(1) \times .35 + (2) \times .35 + (3) \times .25 + (4) + (5)$

Your letter grade is determined as follows and may be adjusted depending on students' performance.

96 - 100: A (4.0)	66 - 69: B- (2.5)
90 - 95: A- (3.75)	60 - 65: C (2.0)
80 - 89: B+ (3.5)	< 60 : F
70 - 79: B (3.0)	Incomplete (I), withdrawal (W)

\* Students who missed 30 percent (or more) of class MAY NOT pass this course.

**Appealing the Grade:** If you object to any grading decisions, you may appeal the grade to the instructor. The appeal must be given along with original documents (e.g., quiz and exam) to the instructor no later than 24 hours after the grade is released.

## CLASS POLICY

**Attendance and Lateness:** Students should attend each class and be present before each class begins. Being 15 minutes late is considered absent from the class. Excused absences for special circumstances (e.g., sickness) may be arranged in advance and will not influence the attendance grade. There is no formal seating chart.

**Academic Misconduct:** Students should not only gain knowledge and skills, but also build their character. Particularly, public managers should equip themselves with high and strict professional standards and ethics. All students should complete their own work and be

evaluated based upon their work. Students should avoid academic dishonesty and misconduct including *plagiarism*, *fabrication* (falsification), and *cheating* (collaboration). A student must not reproduce ideas, phrases, or sentences of another person without appropriate acknowledgment. Students must give credit to the originality of others and acknowledge an indebtedness whenever they quotes/paraphrases another person's actual words, either oral or written; employs another person's idea, opinion, or theory; or borrows facts, statistics, or other illustrative materials. The penalty for violation ranges from sanctions of 0 score for particular assignment/exam and immediate F for final grade, and up to expulsion from the university.

**Course Feedback:** Given diversity in their backgrounds, students are always encouraged to make comments and suggestions on this class (e.g., readings, lecturing, presentation, and class discussion) in order to improve this course. If you don't feel comfortable studying in the class, do not hesitate to talk to the instructor. Any form of communication (e.g., walk-in, phone, email, facebook, etc.) will do. A constructive feedback may be awarded extra credits. No feedback will influence your grade negatively in any circumstance.

**Use of Electronic Devices:** Before each class and lab begins, students MUST turn off their cellular phone (smart phone), laptop, netbook (mini laptop), iPad, Galaxy tablet, and/or CD/MP3/DMB players that may distract the instructor and their classmates. But you may use an electronic dictionary. Please concentrate on lecture and discussion.

**Computer Literacy:** Students should be able to access computers in IUJ computer clusters and use Web browser (e.g., Firefox) to navigate Web sites and download materials. This course will use Microsoft Excel Solver (version 2003 or later) and/or Stata (version 13 or later). If you are not feeling comfortable with this computing requirement, please talk to the instructor IMMEDIATELY.

**IUJ Electronic Mail:** All students must use the university electronic mail to communicate with the instructor and other classmates. Students SHOULD peruse emails that the instructor sends in order for additional explanation and comments. You may not misuse email (e.g., a message without a title of email and sender's identity, a message containing irrelevant expressions and infringement of privacy, and a message sent to receivers who are not related to the subject).

**Course Web Page:** <http://www.sonsoo.org/policy/modeling/> provides the latest course schedule, announcements, and various course materials including lecture notes. Students MUST visit this Web page time to time to check announcements and materials available.

**Format and Styles:** This course employs the metric system. Please use a period (.), NOT a comma (,), to indicate the decimal point (e.g., **3.14**, NOT **3,14**).

**Videotaping of Lecturing:** The lecturing (not students) will be videotaped by the instructor to improve his English and communication skills as suggested by the president office early this year. The video clips will be used ONLY for academic purposes.

## READING MATERIALS

You MUST have the following required textbook that can be purchased from online bookstores like [amazon.co.jp](http://amazon.co.jp). You will not be able to do homework or take exam

successfully without the textbook. A hardcopy (as opposed to electronic forms like PDF) of the textbook is necessary. Some students prefer electronic forms of the textbook and articles due to their cost saving and convenience, but these electronic forms may not provide as much information and effectiveness as hardcopies. You MAY NOT use electronic copies of the textbook during the exam.

Hillier, Frederick S., and Mark S. Hillier. 2014. *Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets*. 5<sup>th</sup> ed. (International Edition) McGraw-Hill. ISBN 978-1259010675.

You are also asked to read some book chapters and journal articles listed in the course schedule below. Students should read all required readings (e.g., journal articles and book chapters) before class. Related video clips and Internet resources are available in the course Web page.

This course has following recommended readings that are available at the MLIC Library reserve for 3-hour checkout. If you have difficulty reading Hillier & Hillier (2014), try Albright & Winston (2005), Anderson et al. (2010), Ragsdale (2010), or Stevenson & Ozgur (2007). Hillier & Lieberman (2014) and Winston (2004) are commonly used textbooks that covers various methods comprehensively. Finally, Boardman et al. (2011), Weimer & Vining (2010), and Dunn (2012) are policy analysis textbooks that provide policy analysis frameworks.

Albright, S. Christian, and Wayne L. Winston. 2005. *Spreadsheet Modeling and Applications: Essential of Practical Management Science*. Belmont, CA: Thomson. ISBN 978-0534380328.

Anderson, David R., Dennis J. Sweeney, Thomas A. Williams, Jeffrey D. Camm, and R. Kipp Martin. 2010. *An Introduction to Management Science: Quantitative Approaches to Decision Making*. 13<sup>th</sup> ed. South-Western. ISBN 978-1111532222.

Boardman, Anthony E., David H. Greenberg, Aidan R. Vining, and David L. Weimer. 2011. *Cost-Benefit Analysis: Concepts and Practice*. 4<sup>th</sup> ed. Boston: Prentice Hall. ISBN 978-0137002696.

Dunn, William N. 2012. *Public Policy Analysis*. 5<sup>th</sup> ed. Upper Saddle River, NJ: Pearson Education. ISBN 978-0205-252572.

Hillier, Frederick, and Gerald Lieberman. 2014. *Introduction to Operations Research*. 10<sup>th</sup> ed. McGraw-Hill. ISBN 978-9814577205.

Ragsdale, Cliff. 2010. *Spreadsheet Modeling & Decision Analysis: A Practical Introduction to Management Science*. 6<sup>th</sup> ed. South-Western Cengage Learning. ISBN 978-0538746311.

Stevenson, William J., and Ceyhun Ozgur. 2007. *Introduction to Management Science with Spreadsheets*. McGraw-Hill. ISBN 978-0073252902.

Weimer, David L., and Aidan R. Vining. 2010. *Policy Analysis: Concepts and Practices*. 5<sup>th</sup> ed. Boston, MA: Longman. ISBN 978-0205781300.

Winston, Wayne L. 2004. *Operations Research: Applications and Algorithm*. 4<sup>th</sup> ed. Duxbury Press. ISBN 978-0534380588.

In order to get the electronic copy of a journal article, (1) visit IUJ's E-journal portal, (2) provide a journal name (e.g., *Public Administration Review*), (3) choose a source (e.g., JSTOR and EBSCO) of the journal, and then (4) find out the paper using its title, author name, year of publication, volume, and/or number.

## WEEKLY SCHEDULE

\* This schedule is tentative and subject to change. Students should check the latest schedule on the course Web site from time to time. All class notes and some required readings other than Hillier & Hillier (H&H) (2014) are available on the course Web site.

### 1<sup>st</sup> Week: Introduction (April 4/5)

This week discusses basics of policy analysis and then introduces basics of cost benefit analysis using Kerry's Kaldor-Hicks Tableau.

#### Required:

- H&H (2014) Chapter 1.
- Weimer & Vining (2010) Chapter 2.

#### Optional:

- Albright & Winston (2005) Chapter 1, 2.
- Boardman, Greenberg, Vining, and Weimer (2011) Chapter 1.
- Weimer & Vining (2010) Chapter 14, 15 or Dunn (2012) Chapter 1, 2.
- Krutilla, Kerry. 2005. Using the Kaldor-Hicks Tableau Format for Cost-Benefit Analysis and Policy Evaluation. *Journal of Policy Analysis and Management* 24(4): 864-875.

### 2<sup>nd</sup> Week: Policy Modeling and Linear Programming 1 (11/12) — Quiz on 12<sup>th</sup>

The first session discusses basics of policy modeling. The second section introduces linear programming (LP) that has been widely used in the globe. Underlying assumptions and basic components of LP are discussed and followed by formulation and solving strategy of a LP problem.

**Required:** H&H (2014) Chapter 2.

#### Optional:

- Albright & Winston (2005) Chapter 3.
- Stevenson & Ozgur (2007) Chapter 3.

### 3<sup>rd</sup> Week: Linear Programming 2 (18/19) — Quiz on 18<sup>th</sup>

Public managers have to understand sensitivity analysis (e.g., shadow price and reduced cost) to interpret the results correctly and substantively.

**Required:** H&H (2014) Chapter 5 (5.1, 5.2, 5.3, and 5.5).

#### Optional:

- Albright & Winston (2005) Chapter 4.
- Stevenson & Ozgur (2007) Chapter 4.

**Lab:** Using Excel Solver 1

- H&H (2014) chapter 4.

### 4<sup>th</sup> Week: Linear Programming 3 (25/26) — Quiz on 25<sup>th</sup>

LP has various variants such as transportation LP, integer programming, and binary programming that are applied to specific circumstances.

**Lab:** Using Solver in Excel 2

- H&H (2014) chapter 4.

**Required:** H&H (2014) Chapter 3.

### **5<sup>th</sup> Week: Midterm and Decision Analysis 1 (May 2/3)**

This week introduces basics of decision analysis including decision criteria under risk and uncertainty.

**Required:** H&H (2014) Chapter 9 (9.1, 9.2, 9.3, and 9.5).

**Optional:** Albright & Winston (2005) Chapter 8.

Stevenson & Ozgur (2007) Chapter 11.

Midterm exam (in-class exam on May 2)

### **6<sup>th</sup> Week: Decision Analysis 2 (9/10) — Quiz on 9<sup>th</sup>**

This week discusses the value of perfect information or sample information.

**Required:** H&H (2014) Chapter 9 (9.6 and 9.7).

**Optional:** Albright & Winston (2005) Chapter 8.

Stevenson & Ozgur (2007) Chapter 11.

**Lab:** Excel for Decision Analysis

### **7<sup>th</sup> Week: Markov Model 1 (16/17) — Quiz on 16<sup>th</sup>**

Markov model (Markov process and chain) employs a general stochastic process to explain behavior of a system.

**Required:** Hillier & Lieberman (2010) Chapter 16 (pp.723-737).

**Optional:** Stevenson & Ozgur (2007) Chapter 12 (pp. 606-630).

### **8<sup>th</sup> Week: Markov Model 2 (23/24) — Quiz on 23<sup>rd</sup>**

This week discusses short-term and long-term behavior of a Markov chain and then explains how the model is applied to various policy problems.

**Required:** Hillier & Lieberman (2010) Chapter 16 (pp.737-748)

**Optional:**

- Stevenson & Ozgur (2007) Chapter 12 (pp. 630-649).
- Winston (2004) Chapter 17.

### **9<sup>th</sup> Week: Queueing Model 1 (30/31) — Quiz on 30<sup>th</sup>**

This week introduces queueing model and explains such basic components as client arrival process, service provision (death process), queue properties, and queue disciplines.

**Required:** H&H (2014) Chapter 11 (pp. 433-453).

**Optional:** Albright & Winston (2005) Chapter 11.

**10<sup>th</sup> Week: Queueing Model 2 (June 6/7)**

This week discusses implications queueing theory for designing a public service provision scheme.

**Required:** H&H (2014) Chapter 11 (pp. 453-476).

**Optional:**

- Hillier & Lieberman (2010) Chapter 17.
- Stevenson and Ozgur (2007) Chapter 13.

Final exam (in-class exam)