The Hong Kong Polytechnic University

Subject Description Form

Subject Code	LGT6006
Subject Title	Statistics and Game Theoretic Methods for Business Analysis and Decisions
Credit Value	3
Level	6
Normal Duration	1-semester
Pre-requisite / Co-requisite/ Exclusion	Nil
Role and Purposes	The basic objectives of this subject are the following: a. To provide basic knowledge on game theory and statistics. b. To understand the differences between Bayesian and classical statistics. c. To expose students to research problems which need both equilibrium analysis of games and empirical studies.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. Derive and interpret some of the basic statistic and econometric methods, and be able to apply the appropriate techniques in research design. b. Understand the basic Bayesian computation and techniques, and be able to incorporate the relevant analysis in quantitative studies. c. Apply the basic game theoretical methods to solve problems of practical interests, and interpret business phenomena from game perspectives.
Subject Synopsis/ Indicative Syllabus	The course aims to armor students with necessary knowledge on statistics and game theoretical models. The course is suitable for business graduate students who wish to get prepared for quantitative analysis. This course consists of two parts: game theory and statistics. In the first part, the course will provide an introduction to Nash equilibrium, non-cooperative game, cooperative game and Bayesian game. Classical game models will be discussed in class to shape the students' logical thinking. It will also provide students with up-to-date discussions on the latest issues in supply chain management, behavioral study, information management. In the second part, the course will provide students with knowledge on probability theory, common families of distributions, point estimation, interval estimation, hypothesis testing and ANOVA. It will also include some Bayesian methodologies.

<table>
<tr><td>Teaching/Learning Methodology</td><td>The teaching approach will be a combination of lectures, assignments, class discussions and presentations. Basic concepts and technical knowledge of Statistics and game theory will be covered in lectures. Students are expected to read the relevant text materials before lectures. Students are encouraged to discuss with the lecturers about problems in the lectures and for possible research topics related to the subject.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td></td><td></td><td></td></tr>
<tr><td>1. Continuous Assessment</td><td>100%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Presentation and Final Project</td><td>100%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

To pass this subject, students are required to obtain Grade D or above in the Continuous Assessment components.
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>· Lecture/Tutorial</td><td>33 Hrs.</td></tr>
<tr><td>· Sample study presentation</td><td>6 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>· Sample papers study</td><td>48 Hrs.</td></tr>
<tr><td>· Review and homework</td><td>39 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>126 Hrs.</td></tr>
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<tr><td>Reading List and References</td><td>

1. Fudenberg and Tirole (1992), Game Theory, MIT Press.

2. Tirole, J (1988), Theory of Industrial Organization, MIT Press.

3. von Neumann, John and O. Morgenstern (1944), Theory of games and economic behavior, Princeton: Princeton University Press

4. Braden, David J., Marshall Freimer 1991. Informational dynamics of censored observations. Management Sci. 37 1390–1404.

5. Lariviere, M. & Porteus, E. 1999, Stalking Information: Bayesian Inventory Management with Unobserved Lost Sales, Management Science 45 346-363.

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	6. Arnab Bisi, Maqbool Dada, and Surya Tokdar. 2011. A Censored-Data Multiperiod Inventory Problem with Newsvendor Demand distributions. MSOM 13 525-533. 7. Anupindi, R., M. Dada, and S. Gupta, 1998. Estimation of consumer demand with stock-out based substitution: An application to vending machine products. Marketing Science 17 406-423. 8. Kok, G. and M. Fisher. 2007. Demand estimation and assortment optimization under substitution: Methodology and application. Operations Research. 55 1001-1021. 9. Garrett van Ryzin, Gustavo Vulcano, Richard Ratliff. 2010. Estimating primary demand for substitutable products from sales transaction data. Forthcoming, Operations Research.