Objective: The objective of this course is (1) to get you acquainted with the most important research in Revenue Management and other topics in Operations Management (2) to provide you with tools necessary to model, formulate and analyze the problems with practical backgrounds, (3) to stimulate your research ideas through paper discussions, and (4) to explain key results and identify managerial insights.

Outline: The course will be composed of a combination of lectures, paper presentations by the instructor and students, and class discussions. The main topics include an introduction of revenue management, capacity allocation (inventory control), dynamic pricing, revenue management games, robust revenue management, behavioral operations management including choice modelling, admission control, principal and agent modelling, and resource pooling. The possible modelling techniques that are briefly introduced are dynamic programming, game theory, consumer choice models, the newsvendor problem, robust optimization, comparative statics, and contract theory.

Paper discussion is the core of the course. For each session, a few papers are selected. You will be required to read some highlighted papers very carefully. You may skim other papers by reading the introduction, the problem, the framework of main methodologies, key results, and conclusions/insights. Students are expected to be extremely active in class by asking and answering many questions and making critical comments in each session.

There will be one presentation per student. You will be informed of your presentation time and paper during the course. There will be several pieces of homework: computational implementation in MATLAB of some numerical methods, provisions of proofs for some theoretical results, and refereeing papers.


Recommended books:


Software: MATLAB.

Assessment: Homework (50%), paper discussions and presentations (50%).

Guidelines for paper discussants: The discussant for each paper should become an expert of the paper: clearly understand the problem, literature, model, solution methodology, key results, and insights. You should aim to lead the session, ask and answer questions, and provide your assessment of the paper. Ideally, you can do all these in your own language and without frequently flipping over the paper during your session. To achieve this goal, you not only need to read the paper carefully and repeatedly and take your own notes, but also read the literature and compare the paper (problem, model, methodology, results, and insights) with other similar papers. Sometimes, a review paper can help you to summarize the literature.

Your presentation should last about 45 minutes. You may use data/overhead projector, or white board for your presentation. In order to manage your time and outcome, you are recommended to rehearse your presentation several times in advance. Make sure that you do not plan to cover too much (e.g., over 20 slides may be too much). Your presentation should include the following:

(1) What is the problem? What objectives does the paper want to achieve? What messages does the paper want to deliver?

(2) What is the model? What key assumptions are made?

(3) Give a brief literature review and compare the paper with other similar papers.

(4) Describe the methodology used in the paper and its relationship to other methodologies in the literature.

(5) Explain key results and managerial insights. How do they help business managers? Are these results intuitive or counter-intuitive? Do they make sense? Tables and diagrams are useful.

(6) What major contributions (applications, methodology, or managerial insights) are made by the paper?

(7) What are the strengths and shortcomings of the paper? Can you think of any future research from the paper?

The list is long and your time is limited. You need to arrange your time appropriately so that you do not waste your time on minor issues and do give enough time for the most important points.
## Draft Course schedule:

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Topics</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wednesday 30 Apr</td>
<td><strong>Introduction to Revenue Management</strong>&lt;br&gt;History, RM characteristics, RM applications, capacity allocation, Littlewood rule, EMSRa, EMSRb, dynamic programming, air-cargo.</td>
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<tr>
<td>2</td>
<td>Thursday 1 May</td>
<td><strong>Network Capacity Allocation</strong>&lt;br&gt;DLP, PNLP, RLP, booking limits control, bid-price control, DAVN, asymptotical convergence, generalized attraction model, choice, assortment, upgrade, MATLAB implementation.</td>
<td>HW 1</td>
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<tr>
<td>3</td>
<td>Wednesday 7 May</td>
<td><strong>Pricing</strong>&lt;br&gt;Static pricing, dynamic pricing, price guarantee, optimal control, make-to-order, make-to-stock.</td>
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<tr>
<td>4</td>
<td>Thursday 8 May</td>
<td><strong>Modelling Tools</strong>&lt;br&gt;Game theory, Nash equilibrium, existence, uniqueness, discrete consumer choice models, linear model, multinomial logit model, lattice theory, supermodularity, monotone comparative statics, robust optimization, worst-case analysis, absolute and relative regrets.</td>
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<tr>
<td>5</td>
<td>Wednesday 14 May</td>
<td><strong>Principal and Agent Model</strong>&lt;br&gt;Asymmetric information, adverse selection, moral hazard, revelation principle, screening, coordination, first-best, second-best.</td>
<td>HW 2</td>
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<tr>
<td>6</td>
<td>Thursday 15 May</td>
<td><strong>Robust Revenue Management</strong>&lt;br&gt;Newsvendor problem, critical fractals, worst-case analysis, absolute and relative regrets, assortment, complete efficient set, Bayesian games.</td>
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<td>7</td>
<td>Wednesday 21 May</td>
<td><strong>Revenue Management Games</strong>&lt;br&gt;Nash equilibrium, existence, uniqueness, strategic consumers, open-loop, feedback strategy, differential games, centralization, decentralization, comparative statics.</td>
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<td>8</td>
<td>Thursday 22 May</td>
<td><strong>Admission Control</strong>&lt;br&gt;Queueing, admission control, monotone comparative statics, threshold policy, scheduling rule, fluid model, switching curve.</td>
<td>HW 3</td>
</tr>
<tr>
<td>9</td>
<td>Wednesday 28 May</td>
<td><strong>Behavioral Operations Management</strong>&lt;br&gt;Choice modeling, bounded rationality, bullwhip effect, coordination, discretionary task completion, flexibility.</td>
<td>HW 4</td>
</tr>
<tr>
<td>10</td>
<td>Thursday 29 May</td>
<td><strong>Resource Pooling</strong>&lt;br&gt;Pooling, flexibility, diversification, hedging, real options, network configuration, mean-variance, partial pooling.</td>
<td></td>
</tr>
</tbody>
</table>
Session 1 (Wednesday 30 April): Introduction and Single-leg Capacity Management


Session 2 (Thursday 1 May): Network Capacity Management


Session 3 (Wednesday 7 May): Pricing


Session 4 (Thursday 8 May): Modelling Tools


Session 5 (Wednesday 14 May): Principal and Agent Models


Session 6 (Thursday 15 May): Robust Revenue Management


Session 7 (Wednesday 21 May): Revenue Management Games


Session 8 (Thursday 22 May): Admission Control


Session 9 (Wednesday 28 May): Behavioral Operations Management


**Session 10 (Thursday 29 May): Resource Pooling**


**Note.** Please download the reading papers from the LBS Library. The LBS library provided the following information of the electronic access to the journals listed:

• American Economic Review from 1911 to present.

• Management Science from 1954 to present.

• Manufacturing & Service Operations Management from 1999 to present.

• Operations Research from 1952, 1956 to present.

• Transportation Science from 1967 to present (24 month embargo).
Appendix: Relevant Books For Your Reference

Revenue Management


Behavioral Operations Management


Discrete Choice Modelling


Game Theory


Principal and Agent Modelling


Stochastic Modelling


Appendix: Relevant Review Papers For Your Reference

Revenue Management


Choice Modelling


Game Theory and Principal and Agent Modelling


Robust Optimization
