OM4076: O.P.S. - Operations Planning and Scheduling

Overview

This course introduces students to planning and control as practiced in state-of-the-arts firms. The principles of inventory and capacity are covered. Specific topics include product prioritization based on bottleneck (capacity-constrained) resources and profitability, inventory modeling, resource planning, just-in-time/lean systems, factory dynamics and benchmarking models, the impact of variability on performance, and applications of operations planning.

Goals

This Operations Management elective enhances

- Understanding Problems & Practices in Operations Planning
- Critical Thinking (Quantitative Problem Solving Techniques)
- Effective Communication (Project Presentation, Class Discussion)
- Information Literacy & Knowledge Integration (O.P.S. Basics, Intuition, Synthesis, Applications)

Requirements

OM 3080 Management of Operations

Students are expected to abide by the following rules:

1. Get access to the materials listed for this course.
2. Keep abreast with material at the Blackboard course website.
3. Prepare for, attend, and participate in class.
5. Bring to the instructor’s attention anything that can help improve the structure, content, and execution of the course.

Evaluation

30% Assignments: Best 4 out of HW# 1-5
60%: Any 3 out of 4 - Two Exams, Littlefield Game, Course Project [Choice of Project must be finalized by the end of Week 8.]
10% Class Participation [Info on participation provided on page 3.]

Materials

Course materials include:

- **Required Text**: *Factory Physics - The Foundations of Manufacturing Management*, W.J. Hopp & M.L. Spearman, 3rd edn.; 2nd edn. may work with extra effort; copies are on reserve at Langsam library.
- **Required Online Computer Game**: Littlefield Technologies (by Responsive Learning Technologies, Inc.)
- **Canopy Blackboard website** [https://canopy.uc.edu](https://canopy.uc.edu)

Milestones – see schedule

- **May 22; Jun. 5, 19; Jul. 10, 19**
  Assignment Due-dates (pick best 4)
- **Jun. 13-21; Jul. 26-Aug. 3**
  Exams: Mid-semester & Final
- **Game likely Jul. 11-18; Report Jul. 24**
  Littlefield Game Play (Team Registration by 7/3; report due 7/24)
- **May 10, Jun. 7, 28, Jul. 19, 26, 31**
  Team Project Presentations (Jul. 26, 31). Team (5/10), Topic (6/7), Content (6/28), Draft pptrx/pdf (7/19)
Tentative Course Schedule (including class date, topic, readings, and assignments, actions, or submissions)

<table>
<thead>
<tr>
<th>Week 1-Intro. Info Sheet, Team</th>
<th>5/8 Course Intro, OPS Innovations, PQ Problem Chap. 0, PQ Exercise Debrief, Section 16.3 (Product Mix) Student Info Survey</th>
<th>5/10 PQ Problem—Analysis, Linear Program, Unit Profit vs. Bottleneck Ratio Method, Practice Problems Form Teams for Group Work; Discuss Proj. Topics</th>
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<tr>
<td>Week 2-Intro.Register 4 Littlefield</td>
<td>5/15 Complete PQ Practice Problems, Human Element Laws, Red Beads Debrief Chap. 11, Team Configuration Info. Due (Gsheet)</td>
<td>5/17 Complete Human Element Laws; Intro to Inventory &amp; Economic Order Quantity (EOQ) Model, Chap. 2 (2.1-2.2), Work on HW1</td>
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<td>Week 3-Inventory HW1</td>
<td>5/22 EOQ Model &amp; Practice Problem Power-of-Two Reorder Interval Chap. 2 (2.2), HW1 (PQ, Human Element)</td>
<td>5/24 Wagner-Whitin Dynamic Lot-sizing Chap. 2 (2.3), Littlefield Game Student Registration, <a href="http://op.responsive.net/lt/rao/start.html">http://op.responsive.net/lt/rao/start.html</a></td>
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<td>Week 4-Inv. L.Team.Reg.</td>
<td>5/29 Complete Dynamic Lot-sizing Practice Problem, Intro to Inventory Control with Uncertain Demand—Newsvendor. Work on HW2</td>
<td>5/31 Newsvendor Practice Problems &amp; Extensions Chap. 2 (2.4.1, skim 2.4.2) Littlefield Team Registration</td>
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<td>Week 5-Inv. HW2 Project Topic</td>
<td>6/5 Base-stock or Order-up-to Policy, Intro to (Q,r) Inventory model Chap. 2 (skim 2.4.2, 2.4.3) HW2 (EOQ, WW Lotsizing, Newsvendor)</td>
<td>6/7 (Q,r) Inventory model and Practice Problem Chap. 2 (skim 2.4.3) Note: (Q,r) is used in Littlefield Game Team Project Topic Due</td>
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<td>Week 6 - MRP Mid.Exam</td>
<td>6/12 Material Requirements Planning (MRP); MRP Explosion &amp; Example, Chap. 3 (thru’ 3.1.4) Take-home Mid-sem. Exam available Wed., 6/13</td>
<td>6/14 MRP Lot-sizing &amp; Example; Extensions: Safety Stock, Manufacturing Resource Planning (MRP-II) Chap. 3 (Section 3.1.5-7, 3.2),</td>
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<td>Week 7 - JIT Mid.Exam</td>
<td>6/19 Intro to JIT / TPS / Lean (Kanban, Heijunka) Chap. 4 (mainly 4.1-4.4), Work on HW3 (MRP, JIT)</td>
<td>6/21 JIT / TPS / Lean (Kanban); Chap. 4 (Section 4.6 on Pull Systems), Skim thru’ Chap. 5, MID-SEMESTER EXAM – DUE BY THURS., 6/21.</td>
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<td>Week 8 - FacDyn. HW3, Proj. Content</td>
<td>6/26 FACTORY DYNAMICS Intro – CT, TH, WIP, Best Case, Worst Case Example # 1 Chap. 7 (thru’ Section 7.3.2), HW3 (MRP, JIT) Littlefield Team Registration, Reminder!</td>
<td>6/28 Factory Dynamics – Practical Worst Case (PWC), complete Example # 1; Example # 2 Chap. 7 (7.3.3) Determine Team Project Content</td>
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<td>Week 9 - FacDyn. SAP Littlefield Data</td>
<td>7/3 Enterprise Resource Planning (ERP), Intro. to SAP &amp; lab session [or The Goal Movie?] Chap. 3 (3.3, 3.4), SAP Global Bike Materials on Bboard Littlefield Team Registration – Final Call!!</td>
<td>7/5 Factory Dynamics –Complete PWC Example #2; VARIABILITY Basics: Flaw of Averages; Coefficient of Variation (CV), Chap. 7 (7.3.3-7.3.5), Chap. 8 (8.1-8.3), Work on HW4, Littlefield Game Data Available</td>
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<td>Week 10 - Var. Littlefield Game, HW4</td>
<td>7/10 CV with Machine Breakdown, Example; Flow Variability Littlefield Game Interface; Data; Demand Forecast Chap. 8 (8.4, 8.5), HW4 (Fac. Dynamics)</td>
<td>7/12 G/G/1 queue &amp; Example; Intro to G/G/m Chap. 8 (8.6.1-8.6.4) Littlefield Game – Kit Inventory, Contract Choice</td>
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<td>Littlefield Game Play</td>
<td>Littlefield Computer Simulation Game play week – start and stop dates and times TBD: 7/11-7/187 ~ <a href="http://ops.responsive.net/lt/rao/start.html">http://ops.responsive.net/lt/rao/start.html</a></td>
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<td>Week 11-Var. HW5, Project Draft</td>
<td>7/17 G/G/m queue &amp; Example, VUT Spreadsheet, Chap. 8 (8.6.5-8.6.7), Work on HW5 Littlefield Discussion – Game End-play</td>
<td>7/19 Two-station line, Example; variability reduction &amp; risk pooling, Chap. 8 (8.8), HW5 (Variability), Project Milestone – Initial Draft</td>
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<td>Week 12 - Synth. Game Report, Projects</td>
<td>7/24, Pull Planning Framework &amp; Scheduling or Factory Physics Parable [Catch-up Class] Skim thru’ Chap. 13, 15; See Blackboard or Section 19.4 Littlefield Team Reports Due</td>
<td>7/26 Project Presentations / Guest Speaker Review for Final Exam</td>
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<td>Week 13 Projects, Final</td>
<td>7/31 Project Presentations (continued) Review for Final Exam</td>
<td>8/2 No class, Work on Final Exam (due on Blackboard by Friday, 8/3).</td>
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Notes: This is an “intense” class packed with information – plan to devote sufficient time to learning class materials. Details on the above schedule will be provided after students’ input from class is incorporated, particularly the dates and times of Littlefield game play, Toyota plant tour (www.toyotaky.com), guest speaker, and project presentations. Schedule updates will be posted on Blackboard. Tour sign-up, if any, will be through Google docs, details TBA after discussion in class.

Miscellaneous Information:

- Professional Societies – Posted on Blackboard under External Links
• For OM4076, APICS: American Production and Inventory Control Society membership is recommended (offers scholarships, plant tours, guest speakers), http://www.apics.org, http://www.apics-cincy.org, or APICS at UC on blackboard; contact Prof. Charles Sox (soxcr@ucmail.uc.edu)

• **Required Text:** *Factory Physics: The Foundations of Manufacturing Management,* W.J. Hopp & M.L. Spearman, 3rd Edn., 2008 or later.

  • Two copies each of the second and third editions are on 2-hour reserve at Langsam library FYR.
  • Discuss fundamental OM concepts and techniques, including Inventory, MRP/ERP, JIT, Factory Dynamics, and Variability, yielding a system of laws. For example,
    - **Fac. Dyn.:** Proper internal benchmarks are needed to evaluate current and potential future performance.
    - **Var.:** System performance typically degrades with increasing variability.
    - **Human:** Responsibility without commensurate authority & training is demoralizing / counterproductive.
  • Factory Physics laws relate various measures of operations performance, such as throughput (TH), cycle time (CT), work-in-process (WIP) inventory, customer service, variability, and quality, in a consistent manner.
    - E.g., WIP = TH × CT
    - Provide a framework for evaluating classical OM techniques as well as evolving new strategies.

• Active class participation is essential. Opportunities for learning include lectures / discussion, readings, hands-on exercises and assignments, short case studies, plant tours, guest speaker, online game, and a team project. For class participation credit, you will be required to participate in in class, by attending class, working on class exercises, asking clarification questions when appropriate, answering questions posed in class, actively contributing to your learning and that of others in class. You may be asked to present / discuss lecture materials in class, critique material from a previous class, and provide lessons learnt. Near the end of the semester, students must submit a brief statement discussing their class participation. This statement must also include a rating of contribution by each team member for all team related activities. Some criteria for effective class participation are:
  - Is the participant a good listener? Are the points made relevant to the discussion and linked to the comments of others? Do the comments show evidence of analysis of the problem, practice, or case? Is there a willingness to participate? Do the comments clarify, highlight, and synthesize important aspects of earlier comments and lead to a clearer statement of the concepts being covered or to new knowledge/ insights? Do the comments identify overlooked points and points that turn out to be influential in further discussion? Are comments well thought out?

• **Special needs** related to your participation in this course? Please meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this challenging course.

• **Quantitative Assignments**, HW1-6, may be done in groups of at most two, submit one assignment for each group. Feel free to discuss key course concepts with instructor / peers (don’t just copy); work on assignment questions early.

• **Team-based assignments** (Littlefield game, project presentation) must be done in groups of at least two and at most four.

• Additional detailed information on the Littlefield Game, Course Project, and Exams will be available separately.

• **Course grades depend on your overall score compared to the class average and not on absolute score.** To get the best possible grade, you should seek to excel on all assessment entities. Doing poorly on several assessments will lead to a poor grade; doing well on some assignments and poorly on others will lead to an intermediate grade. The instructor will try to provide feedback on tentative-grade-so-far after the mid-semester exam.

• Independent and creative thinking is encouraged in this course. So in addition to learning course models and materials, you should plan to exercise your grey cells and adapt course materials to related, but seemingly different environments.

• In the spirit of Lincoln’s “of the people, by the people, for the people,” this operations planning course is being taught for you, based on what the instructor believes to be useful to you. The instructor is always open to student suggestions.