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

Overview

This course introduces students to planning and control as practiced in state-of-the-art firms. The principles of inventory and capacity management 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 & Online Game)

Requirements

OM 3080 Management of Operations

Students also are expected to abide by the following rules:

1. Get access to the materials listed for this course (see right column).
2. Keep abreast with material at the Canopy Blackboard course website.
3. Prepare for, attend, and participate in class.
4. Submit own work done specifically for OM4076; follow student code of conduct, [http://www.uc.edu/conduct/Code_of_Conduct.html](http://www.uc.edu/conduct/Code_of_Conduct.html) and its LCB “Academic Integrity” version, [http://business.uc.edu/student-resources/academic-resources/advising/resources.html](http://business.uc.edu/student-resources/academic-resources/advising/resources.html).
5. Bring to the instructor’s attention anything that can help improve the structure, content, and execution of the course.

Evaluation

36% Assignments: HW# 1-4 (9% each)
54%: Best 3 out of 4 - Two Exams, Littlefield Game, Course Project
10% Class Participation

Materials

Course materials include:

- **Required Text:** *Factory Physics - The Foundations of Manufacturing Management*, W.J. Hopp & M.L. Spearman, 3rd Edn., 2008 or later; 2nd edn. may work with some extra effort
- **Online Computer Game:** Littlefield (by Responsive Learning Technologies, Inc.) [http://op.responsive.net/lt/rao/start.html](http://op.responsive.net/lt/rao/start.html)
- **Canopy Blackboard website** [https://canopy.uc.edu](https://canopy.uc.edu)

Milestones – see schedule

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Tentative Course Schedule (including class date, topic, readings, and assignments or submissions); T = Tuesday, R = Thursday.

| Module 1A, 6/22 R, InfoSheet, Form Team | OPS Course Intro, Innovations in OM, PQ Intro Chap. 0, Sect. 16.3 (Product Mix) Fill Student Info Survey | PQ Problem- Analysis, Linear Program, Bottleneck Ratio, Practice Problem # 1 Sect. 16.3, PQ Exercise Debrief | PQ Practice Problems (contd.) The Goal Movie – Part 1 (15 min) or Human Element, Chap. 11 Team Configuration (Members) |
| Module 1B, 6/27 T, Register 4 Littlefield | Human Element Laws Chap. 11 Littlefield Individual Registration | Human Element Laws, Red Beads Debrief, Intro to Inventory Chap. 11, Chap 2. Work on HW1 | Inventory contd., Economic Order Quantity (EOQ) Model, Example Chap. 2 (2.1-2.2) |
| Module 2A, 6/29 R, HW1 Due Project Topic | EOQ Practice Problem (contd.) Reorder Interval, T, Power-of-Two Reorder Interval Chap 2 (2.1) HW1 Due (PQ, Human Element) | Power-of-Two example, Dynamic Lot-sizing, Chap. 2 (2.3) Inv. with Uncertain Demand, Newsvendor Chap. 2 (2.4.1) | Newsvendor (contd.); Examples including EcoTable Chap. 2 (2.4.1) Decide Project Topic |
| Module 2B, 7/4 T | No class, UC Holiday, Independence Day |
| Module 3A, 7/6 R, Littlefield Team Reg. | Newvendor Examples & Extensions: YB T-shirts; Gap Jeans Base-stock Policy, Inv. Position; Demand During Lead Time | (Order Quantity Q, Reorder Point r) or (Q,r) Inventory model Examples: Bird-feeder and Sam’s Cat Hotel, Work on HW2 | Complete (Q,r) Inventory - Note: (Q,r) Used in Littlefield Game, OPS Case: Sport Obermeyer? (Canopy) Littlefield Team Registration; |
| Module 3B, 7/11 T, HW2 | Intro to Material Requirements Planning (MRP), Chap. 3 (3.1-1.3) HW2 Due (Inventory: EOQ, Newsvendor, (Q,r)) | MRP Explosion Calculations – start Example Chap. 3 (3.1.1-3.1.3) | Mid-sem. Exam Review; TAKE-HOME MID-SEM. EXAM (Available by 5 PM, on Bboard) |
| Module 4A, 7/13 R Mid-Sem. Exam | MRP Lot-sizing; Complete MRP Example, Safety Stock Chap. 3 (Sect. 3.1.4-3.1.9) | Intro to Manufacturing Resource Planning (MRP II); Enterprise Resource Planning Chap. 3 (3.2, 3.3) or SAP Lab? | Intro to JIT / TPS / Lean Chap. 4 (mainly 4.1-4.4) MID-SEMESTER EXAM DUE (Due by 5 PM, July 18) |
| Module 4B, 7/18 T, Mid-Exam | Complete JIT / TPS / Lean Chap. 4 (Sect. 4.6 on Pull Systems) | Complete TPS; MID-SEM EXAM DUE; Work on HW3 Skim thru’ Chap. 5; | Factory Dynamics Intro – CT, TH, WIP, Chap. 7 (till Sect. 7.2) Littlefield Team Registration! |
| Module 5A, 7/20 R, HW3 Game Data | Factory Dynamics – Best Case Sect. 7.3.1 HW3 (MRP, JIT) | Factory Dynamics – Worst Case, Example # 1; Intro to PWC Sect. 7.3.2 | Factory Dynamics – Practical Worst Case, Example # 1 Sect. 7.3.3-7.3.5 Littlefield 50-days Data Available |
| Module 5B, 7/25 T | Fac. Dynamics: Example#2; Littlefield Game Interface; Data; Demand Forecast. Game Starts? | Variability: Flaw of Averages, Coefficient of Variation (CV) Chap. 8. Sect. 8.1-3 | CV with Machine Breakdown; Example, Sect. 8.4, Flow Variability Work on HW4 |
| Module 6A, 7/27 R, ToyotaTour Game Play | Toyota Georgetown Plant Tour (starts 1:30 PM at Toyota Visitor Center, including travel Noon-4 PM) | Littlefield Game Play (spans up to 1 week, details TBD) | |
| Module 6B, 8/1 T HW4 | G/G/1 queue & Example Sect. 8.5, 8.6.1-8.6.4 HW4 Due (Fac. Dynamics, Variability Basics) | G/G/m queue, example, VUT Spreadsheet, Sect. 8.6.5-8.6. | Two-station line; variability reduction & risk pooling, Sect. 8.8 TAKE-HOME FINAL EXAM Available by ~ 5PM on Bboard |
| Module 7A, 8/3, R Game Report, Final Exam | Littlefield Decisions Debrief: # of Machines, Kit Inventory, Contract Choice, Sequencing, End-play | Fac. Physics Principles / Parable, Team Project Presentations / Guest Speaker? | Final Exam Review |

Gray font text is listed FYR and will be covered if time and interest permit in Summer.

Miscellaneous Information:

- **Course Schedule** is built on the principle of continuously covering material little-by-little; you are advised to work regularly to avoid being overwhelmed at milestone times such as exams, project presentations, or even assignments.
Schedule changes, if any, will be posted periodically on Blackboard. If you miss any OM4076 class, you are responsible for reviewing the course material content - **the summer version will not be available on Echo360 podcast**, as I will try to have a more hands-on class this Summer. (If students would still like a podcast recording, we can discuss this in the initial classes and I can check if a podcast and still be recorded; in this case, see Canopy Blackboard for details on how to access OM4076 Echo360 podcast.)

- **Professional Societies** – See Blackboard, under Web and Other Resources.
  - 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.org), [http://www.apics-cincy.org](http://www.apics-cincy.org), or APICS at UC on blackboard; contact Prof. Ruth Seiple ([ruth.seiple@uc.edu](mailto:ruth.seiple@uc.edu))

  - Two copies each of the second and third editions are on reserve at Langsam library FYR.
  - Covers **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., \( \text{WIP} = \text{TH} \times \text{CT} \)
    - 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, case studies, plant tour, guest speaker, online Littlefield game, and a team project

- For **class participation credit**, you will be required to participate in class, by attending class, 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. 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 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**, HW1-4, 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; work on assignment questions early, seek to learn.

- **Team-based assignments** (Littlefield game, project presentation) must be done in groups of about four students.

- 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**. The instructor will try to provide feedback on tentative-grade-so-far after the mid-semester exam.