

EMIS 5/7362: Production Systems Engineering

INSTRUCTOR: Richard S. Barr, Ph.D.

Class time, Fall 2015..... TuTh 3:30-4:50
Classroom Junkins 113
Office hours TuTh 1:30-3:00 (Central)
Office Caruth Hall 323
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Home page lyle.smu.edu/~barr

CLASS SUPPORT

Course web site lyle.smu.edu/~barr/pom
POMLIB software pomlib.com
Course Blackboard courses.smu.edu
Course admin, Tammy (214) 768-1100
Tammy's email tsherwoo@smu.edu

TEXTS

- **Required:** Barr, R.S., *Production Systems Engineering* (2015). Class notes are available from [Alphagraphics](#), 3032 Mockingbird Lane (phone 214-363-1101). Includes 660+ pages of lecture slides, readings, previous exams, priced around \$55 + tax and any shipping. [Includes *Production Systems Handbook*.]
- **Provided:** See Blackboard web site

GRADING SYSTEM

Three (3) exams of equal weighting (1 hour 25 minutes each). The final grade is based

on individual exam *letter grades* using the following table:

Exam letter (value): A+ (12), A (11), A- (10), B+ (9), B (8), B- (7), C+ (6), etc.

To compute your final grade:

- Calculate: Course value = average of the three exam values from table
- Round course value to *nearest* integer (8.499 = 8) and look up the letter grade in the above table.

Example: A, B, A- are your exam grades.

Course value = $(11+8+10)/3 = 9.667 = 10$

Course grade = A-

EXAM DATES (Mark your calendars)

- In class: **October 1** and **November 5**
- At final exam period: **11:30 a.m., Friday, December 11**

POLICIES

- *Dallas-FW-area students (including distance)* must take exams on-campus during regularly scheduled class time.
- *Other distance students* also must take the exams at their sites **on the above dates**. (Exam topics account for the time between the live lectures and when they should be viewed by distance students.)
- *For any missed exam*, a comprehensive 1 hour 25 minute makeup exam will be given Friday, Dec. 11, 1:00 p.m. (final exam time)

SMU Policy Notes¹

¹ *Disability Accommodations:* Students needing academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit <http://www.smu.edu/Provost/ALEC/DASS> to begin the process. Once registered, students should then schedule an appointment with the professor as early in the semester as possible, present a DASS Accommodation Letter, and make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement. *Religious Observance:* Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.) *Excused Absences for University Extracurricular Activities:* Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue) *Plagiarism.* Plagiarism of any kind is prohibited by the SMU Student Honor Code and can lead to significant penalties for those involved.

Topics by Class Session

1. Production Systems8/25

Systems: analysis and design

2. Forecasting Models I8/27

Regression: simple, multiple

3. Forecasting Models II9/1

Time-series methods

4. Decision Analysis9/3

Decision-making techniques,

5. Decision Models9/8

Decision trees, LP models

6. Linear Programming Models9/10

LP model design, solution methods

7. Linear Programming Interpretation.....9/15

LP interpretation, managerial analysis

8. Integer Programming Models9/17

Integer model design

9. Network Models I.....9/22

Distribution and logistics networks,

10. Network Models II.....9/24

*Integrated production/distribution models,
OPTNET*

11. Job-Shop Systems I9/29

Aggregate scheduling methods

12. Exam 1..... 10/1

Covering classes 1-9.

13. Job-Shop Systems II 10/6

Sequencing and scheduling

14. Job-Shop Systems III10/8

Facility design & computer-based layout

Fall break (no class).....10/13

15. Continuous Flow Systems I10/15

Line-balancing techniques

16. Continuous Flow Systems II 10/20

Design of waiting line facilities

17. Operations Simulation I 10/22

Monte Carlo simulation methods

18. Operations Simulation II 10/27

Computer simulation, distributions

19. Project Management I 10/29

CPM, PERT.

20. Project Management II 11/3

Resource leveling

21. Exam 2 11/5

Covering classes 10-18

22. Inventory Systems I 11/10

Independent demand systems

23. Inventory Systems II 11/12

Dependent demand systems: MRP

24. Just-in-Time Methods 11/17

Kanban, pull-based Japanese mfg./inventory

25. Process Engineering 11/19

Process design, performance metrics

26. Quality Engineering 11/24

Total quality assessment, SQC

Thanksgiving (no class)..... 11/26

27. Process Improvement Methods I 12/1

Statistical quality control, process capability

28. Process Improvement Methods II 12/3

Total cycle time, learning curves

Exam 3 Friday, 12/11 (11:30 a.m.)

Covering classes 19-28.

Homework Assignments

- **Assignments.** Problems are assigned from Chapter 17 of the *Production Systems Handbook* (HB, Section 3 of the class notes). Chapter 18 contains the solutions to these problems. Reading assignments from other HB chapters are also given.
- **Supplementary reading (optional).** Supplementary material from the provided e-books, give alternative explanations or further insights into the class topics. E-books provided via Blackboard:
 - [ARC] Arcidiacono, Gabriele, Claudio Calabrese, and Kai Yang. 2012. *Leading processes to lead companies Kaizen Leader & Green Belt Handbook*. Dordrecht: Springer.
 - [AXS] Axsäter, Sven. 2006. *Inventory control*. 2nd edition, Springer E-Books. New York: Springer.
 - [CHH] Chhajed, Dilip, and Timothy J. Lowe. 2007. *Building intuition insights from basic operations management models and principles*. New York: Springer.
 - [CHI] Chiarini, Andrea. 2012. *From Total Quality Control to lean Six Sigma evolution of the most important management systems for the excellence*. Milan: Springer.
 - [EIS] Eiselt, Horst A., and Carl-Louis Sandblom. 2013. *Operations research a model-based approach*. 2nd Edition, Heidelberg: Springer.
 - [JAN] Jank, Wolfgang. 2011. *Business analytics for managers*. New York: Springer.
 - [MUC] Muckstadt, J. A., and Amar Sapra. 2010. *Principles of inventory management when you are down to four, order more*. New York: Springer.
 - [TON] Tonchia, Stefano. 2008. *Industrial project management planning, design, and construction*. Berlin: Springer.
- **After each class, a numbered assignment will be posted on the class web site to be prepared for the next class.**

No.	Topic: Assignment from Handbook ²	Readings
1	Course overview: Email information sheet and photo to instructor. Distance students: reserve exam dates with proctor	
2	Forecasting, simple regression: HB 17.1.1. Read: HB Chapter 2. Optionally, solve other section 17.1 problems using POMLIB's MLR software for the calculations.	[JAN] pp. 41-56
3	Multiple regression: Work all problems in HB section 17.2	[JAN]pp. 57-65
4	Time-series forecasting: Read HB Ch. 3. Work all problems in section 17.3. For 17.3.4, include double-exponential smoothing models in your analysis.	[AXS] pp. 7-23
5	Decision Analysis: Read HB Ch. 4. Work HB 17.4.1	[EIS] pp. 303-312
6	Decision trees: Read HB Ch. 3. Work all problems in section 17.4	[EIS] pp. 315-321
7	Linear programming models: Read HB Ch. 5.1-5.2. Work HB problems 17.5.1, 17.5.2 (these discussed in next class), and 17.5.3 part 1.1.	[EIS] pp. 13-73
8	Linear programming interpretation: Read all HB Chapter 5. Work all problems HB section 17.6, plus 17.5.3. LP formulation practice: 17.5.4, 17.5.5, optional.	[EIS] pp. 84-104

² Problems based on pomlib.com data are indicated by ^{POMLIB} after the Handbook title

9	Integer programming models: Work all problems in HB section 17.7.	[EIS] pp. 123-143
10	Network models I: Read HB Chapter 14. Work HB problems 17.8.1 - 17.8.2. (Optional: 17.8.5, models 1-3.) Practice using the circularized network formulation in completing these. (Directions on circularized networks and the OPTNET software are in HB Chapter 6.)	
11	Network models II: Work HB problems 17.8.3 - 17.8.4. (Optional: 17.8.5, models 4-6.)	
12	Job shop systems I, aggregate scheduling: Work all problems in HB section 17.9.	
13	Job-shop systems II, sequencing and scheduling: Work all problems in HB section 17.10. (HB Chapter 7 describes usage of job sequencing software.)	[CHH] Ch. 1
14	Job-shop systems III, facility layout: Work all problems in HB section 17.11.	
15	Continuous flow systems I, line-balancing: Work all problems in HB section 17.12. Software described in HB Chapter 9.	
16	Continuous flow systems II, queueing systems: Work all problems in HB section 17.13. Software documented in Ch. 10.	[CHH] Ch. 4-5 [EIS] Ch. 13
17	Operations simulation I, Monte Carlo methods: Work all problems in HB section 17.14.	[EIS] Ch. 14
18	Operations simulation II, computer simulation:	
19	Project management I, CPM/PERT: Work problems in HB 17.15.5–15.8	[TON] Ch. 8
20	Project management II, resource leveling: Work problems HB 17.15.1–15.3, 17.15.9.	
21	Inventory systems I, independent demand: Work all problems in HB section 17.16. Watch video at: youtu.be/5Wo2WifN-2I (10 min)	[MUC] Ch. 1-2; [AXS] Ch. 3-4; [CHH] Ch. 8
22	Inventory systems II, dependent demand and MRP: Work all problems in HB Section 17.17	
23	Just-in-time and Lean methods:	[ARC] 213-227
24	Process engineering:	[ARC] pp. 1-10, 16-18.
25	Quality engineering:	[CHI] Ch. 10.
26	Process improvement I, statistical quality control: Work all problems in HB section 17.18	[ARC] pp. 259-276, 111-119
27	Process improvement II, cycle time reduction: Work all problems in HB section 17.19	[ARC] p. 19.

Laboratory Sessions

Times: Tuesdays and Thursdays 7:00-8:20 pm

Location: Caruth Hall 485

Instructor: Toby Huskinson (thuskins@smu.edu)

1. Students can attend either lab time, no matter what section they are officially enrolled in.
2. Lab sessions can also be attended via GoToMeeting.com, an interactive live-streaming web service.
 - The login access codes will be posted on BB or emailed to the class prior to each session.
 - Sessions can be viewed using a browser or the GoToMeeting app for iPhone, iPad, Android devices, and Windows phones.
3. For those unable to attend the live labs, recordings of the lab sessions will be posted on Blackboard under the "All Labs" class (separate from the lecture Blackboard)

Lab Schedule

Lab	Thurs 7p	Tues 7p	Topics
1	9/3	9/8	Regression and time-series forecasting
2	9/10	9/15	Decision trees
3	9/17	9/22	LP modeling and BLP interpretation
4	9/24	9/29	Integer programming & network flow models
No lab this week			
5	10/15	10/20	Sequencing, scheduling, and layout of job shops
6	10/22	10/27	Line balancing, queueing theory applications
7	10/29	11/3	Simulation models
No lab this week			
8	11/12	11/17	Project management, EOQ
9	11/19	11/24	MRP, JIT
10	12/3	12/1	TQM, process engineering, SQC