Department of Industrial & Systems Engineering, Auburn University
INSY-7030 — *Manufacturing Systems Design*
Dr. Kevin R. Gue

# Course Policy

This course covers the design of manufacturing, and to a lesser extent, service systems. We will develop both descriptive and prescriptive models for simple and complex systems. Descriptive models will be based primarily on queueing theory; prescriptive models will employ several algorithmic approaches, which can be implemented on computer systems. Subject areas include (1) basic queueing and service systems, (2) analysis and balancing of flow lines, (3) job shops and manufacturing cells, (4) worksharing systems, (5) flow batching, and (6) WIP-limiting strategies. Evaluation in the course consists of a midterm, a project, and a final exam.

## Instructors

Kevin R. Gue, Ph.D., Shelby 3314, `kevin.gue@auburn.edu`, 844-1425, Office hrs: Wednesday, 1:00–3:00PM.

TA: Hyun Ho Kim, Shelby 3339, `kimhyuh@auburn.edu`, Office hours: Tu-Th, 9:30–10:30.

## Course Materials

- Required (MSMA): Guy L. Curry and Richard M. Feldman, *Manufacturing Systems Modeling & Analysis*, Springer-Verlag, 2009.
- Supplementary (A&S): *Modeling & Analysis of Manufacturing Systems*, Ronald G. Askin and Charles R. Standridge, John Wiley & Sons, 1993.

## References


[1] A. L. Archus. COMSOAL: A computer method of sequencing operations for assembly lines. *International Journal of Production Research*, 4:259–277, 1966.

[2] John J. Bartholdi and Donald D. Eisenstein. A production line that balances itself. *Operations Research*, 44(1), 1996.

[3] Richard Conway, William Maxwell, John O. McClain, and L. Joseph Thomas. The Role of Work-In-Process Inventory in Serial Production Lines. *Operations Research*, 36(2):229–241, 1988.

[4] Roger V. Johnson. Optimally Balancing Large Assembly Lines with 'FABLE'. *Operations Research*, 34(2):240–253, 1988.

[5] David H. Maister. The Psychology of Waiting Lines. In J. Czepiel, editor, *The Service Encounter*. Lexington Books, Lexington, MA, 1984.

[6] John O. McClain, Kenneth L. Schultz, and L. Joseph Thomas. Management of Worksharing Systems. *Manufacturing & Service Operations Management*, 2(1):49–67, 2000.

## Participation

I expect you to be engaged and participating during class. This means paying attention, asking questions, suggesting alternative ways of doing things, and sharing your experiences. Class will start *on time*; I expect you to be there *on time*.

## Final exam policy

The final exam will be offered during finals week on the appointed day, and will be offered only once. Those not taking the final at the appointed time who have a valid, Tiger Cub excuse will receive an incomplete; those without a valid excuse will receive a zero for the final.

## Grades

| | **Percent** |
|---|---|
| Midterm | 35% |
| Project | 25 |
| Final exam | 45 |

You may request a regrade of any exam or assignment by submitting a detailed, one-page explanation of the discrepancy. I will consider each case at the end of the term, but only if it appears that it may change your final grade. (I correct obvious arithmetic errors on the spot.)

## Academic Honesty

All portions of the Auburn University student academic honesty code (Title X11) found in the Tiger Cub will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Violations include, but are not limited to:

**Cheating on an examination.** This includes such things as copying from another's paper, using unauthorized notes, calculators, etc., or giving or receiving unauthorized aid, such as trading examinations, whispering answers, passing notes, or using electronic devices to transmit or receive information.

**Plagiarism.** This is using someone else's work without giving credit. It is, for example, using ideas, phrases, papers, laboratory reports, computer programs, data—copied directly or paraphrased—that you did not arrive at on your own. Sources include published works such as books, movies, web sites, and unpublished works such as other students' papers or material from a research service. In brief, representing someone else's work as your own is academically dishonest. The risk of plagiarism can be avoided in written work by clearly indicating, either in footnotes or in the paper itself, the source of any major or unique idea or wording that you did not arrive at on your own. Sources must be given regardless of whether the material is quoted directly or paraphrased. Copying another student's assignment and putting your name on it is plagiarism.

**Unauthorized collaboration.** This is working with or receiving help from others on graded assignments without the specific approval of the instructor. *If in doubt, seek permission from the instructor before working with others.* Students are encouraged to learn from one another: Form study groups and discuss assignments, but each assignment must be individual work unless specifically stated and turned in as a group assignment. You are encouraged to talk to one another about your assignments, however, all assignments must be done by the student(s) whose name is (are) on it!

**Multiple submission.** This means using the same work to fulfill the academic requirements in more than one course. *Prior permission of the instructor is essential.*

## Accommodations

Students who need accommodations are asked to arrange a meeting during the first week of classes. Bring a copy of the Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have the necessary paperwork, please make an appointment with The Program for Students with Disabilities, 1244 Haley Center, 844-2096.

**Syllabus**
**Fall 2006**

# Manufacturing Systems Design

INSY-7030 Fall 2006

| Date | Topic | Reading | Assignment |
|---|---|---|---|
| 1/8/09 | Introduction | | |
| 1/13/09 | Overview of manufacturing | | |
| 1/15/09 | Review of probability | MSMA 1 | Review prob & simulation |
| | **Single server models** | | |
| 1/20/09 | Simple factory models | MSMA 2 | 2.6, 2.10, 2.13 |
| 1/22/09 | Single stage models | MSMA 3.1-3.4 | 3.2, 3.7 |
| 1/27/09 | Approximating general times | MSMA 3.6 | |
| 1/29/09 | Single server models | MSMA 3.7 | 3.20. |
| | **Designing flow lines** | | |
| 2/3/09 | Processing time variability | MSMA 4.1-4.2 | 4.6 |
| 2/5/09 | Psychology of waiting lines | Maister | |
| 2/10/09 | Serial lines | MSMA 5.1-5.2 | 5.1 |
| 2/12/09 | Line balancing 1 | Askin & Standridge 2 | |
| 2/17/09 | Line balancing 2 | Johnson | |
| 2/19/09 | Buffered lines | A&S 3.5; Conway et al. | |
| 2/24/09 | Buffered lines | | |
| 2/26/06 | Midterm | | |
| 3/3/09 | Self balancing lines | Bartholdi & Eisenstein | |
| 3/5/09 | Self balancing lines | | |
| 3/10/09 | General network models | MSMA 5.3-5.4 | 5.13, 5.17, 5.18 |
| 3/12/09 | General network models | | |
| | **Designing job shops and cells** | | |
| 3/17/09 | Spring Break | | |
| 3/19/09 | Spring Break | | |
| 3/24/09 | Multiple product models | MSMA 6.1-6.4 | 6.6, 6.9 |
| 3/26/09 | Reentrant flow systems | MSMA 6.5 | |
| 3/31/09 | Cellular manufacturing | MSMA 6.6 | 6.13 |
| 4/2/09 | Batch processing | MSMA 7.1-7.3 | 7.2, 7.5 |
| 4/7/09 | Batch processing | MSMA 7.4-7.5 | 7.11 |
| 4/9/09 | WIP limiting strategies | MSMA 8 | 8.9 |
| 4/14/09 | WIP limiting strategies | MSMA 8 | 8.11 |
| 4/16/09 | Flex day | | |
| 4/21/09 | Flex day | | |
| 4/23/09 | Flex day | | |
| 4/28/09 | Course review | | |
| TBD | Final exam | | |