**Course Objective:**
Learn how to design and analyze manufacturing processes to achieve manufacturing system objectives that meet customer quality, cost and delivery requirements in a safe environment. The course project will cover major aspects of manufacturing systems engineering and process design. Emphasis will be placed on the design of manufacturing processes (including assembly systems) in terms of physics and design parameters to meet system cost, quality, product variety and delivery objectives. When to use lean and six-sigma techniques in the context of the manufacturing enterprise design will be evaluated analytically and with computer simulation and physical modeling toolsets.

This course emphasizes a systems engineering perspective and may be used as a core course for the Masters of Science in Engineering (M.S.E.), Systems Engr. Concentration.

**Credits:** 3

**Preparation for Course:**
CE 48700 or ECE 40500 or ENGR 41000 or ME 48700 or Graduate standing. Instructor permission required.

**Level:** Graduate

**Course Outcomes:**
1. Learn how to develop manufacturing processes / equipment that minimizes total system cost, provides required process capability, quality, volume and product-mix flexibility.
2. Understand the “5 delays” that contribute to lead time in system.
3. Learn how to design a manufacturing system to reduce the “5 delays”
4. Learn how to design a robust and controllable manufacturing system.
5. Learn how to design a manufacturing system to minimize cost to achieve a target cost over a given range of production volumes.
6. Learn how to control / reduce manufacturing cost in the context of the system (“value stream”) design.
7. Develop a general framework for characterizing and evaluating manufacturing processes that includes cost, quality and flexibility.
8. Learn how to design a manufacturing system to achieve customer needs in terms of quality and delivery in “spite of” variation.
**Course Themes**

1. Cost cannot be controlled; it is the result of the system design.

2. The design of manufacturing processes must support and comply with manufacturing system objectives.

**Evaluation:**

- 15% Final Exam
- 10% Project Sets
- 25% Homework – Written Presentations, Class Discussion (7 Sets)
- 25% Final Project Write-Up
- 10% Final Project Presentation
- 15% Mid-term Project Presentations and Short Write-Up

**Homework:**

Designated homework assignment will require a short (7 minute) presentation in class, followed by Q&A discussion.

**Project:**

Description to be provided on a separate handout.

**Disability Policy**

If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb Union Bldg., Room 113, telephone number (260.481.6658) as soon as possible to work out the details. Once the director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD "http://www.ipfw.edu/disabilities/".

**Project Sets** – Course project development will be guided by project-set assignments; each week a project set will be exchanged between students. Each student will verify whether the project set is complete or incomplete. If complete, “1” point will be assigned. If incomplete, you will have the opportunity to re-submit the set on the following week to receive full “1” point, if complete. If incomplete, a Project Set receives “0” points. Project sets may be reviewed in class from 8:25 to 8:45 pm, as required.

Assignment Due Date. All Assignments are due by 6:00 pm on the day before the class meeting, by email. All Late assignments will receive zero credit. For every assignment, please bring a hard copy to the class and send an electronic version to the instructor’s campus email.

For Project Sets, please bring a hard copy of your project set to class to give to your colleagues to review and submit an electronic copy by email to the instructor at their campus email.

For Homework, please submit only an electronic copy by email to the instructor at their campus email.
For your mid-term and Final presentation and paper, please submit an electronic copy of your paper and presentation to the instructor by 6pm on the scheduled day of the final exam. **Bring your computer with your presentation file and be prepared to plug your computer into the AV system for your presentation.**

*A Note about technical writing:*
1. Do not use personal pronouns: I, we, he, she, they, it and also you, me, my, mine, etc..

2. When you have to use the word “this”. Please use the form this <noun i.e., a thing>. For example, correct usage: This information is really good. Incorrect usage: This is really good… as the reader does not necessarily know what this refers to, particularly in a technical document.

3. **Use of Acronyms:** When introducing an acronym state the acronym with initial capital letters, for example, Integrated Logistical Support (ILS) and the put the initial caps in parentheses after the acronym that you are introducing.

4. Grammarly. Please check out this tool. The higher the Grammarly score, the better your writing is.

*A Note about assignments:*

1. Please number (paginate all documents that are turned in).

2. Please put your name on all of your work.

3. For presentations, please use at least 18 point type.