TECH 1050 Manufacturing Processes & Systems

Preparing students for a manufacturing environment as a technician, analyst, or engineering technician.

# COURSE DESCRIPTION

Teaches students the essentials of how the manufacturing organization functions, departments support and work together, their connections and roles. Teaches a wide variety of manufacturing skills including: system analysis, system evaluation, operations analysis, quality control analysis, and problem solving. Determine how a system works, its performance, analyze it, evaluate it, and improve it using a variety of tools.

The cost of access to and running manufacturing machinery is extremely expensive. Given lab and equipment access and constraints the course familiarizes students with various manufacturing processes through videos, physical product examples, and factory tours (when possible) such as: casting, welding, sheet metal forming, machining, composites fabrication, injection molding, extrusion, thermoforming, rotational molding, and electronics fabrication.

# COURSE OBJECTIVES

1. Understand the value stream and know where you fit into it, and how to identify waste.
2. Understand at a high level the type of production processes (metals, plastics, composites, electronics, etc.) of how a product is made with 80% accuracy.
3. Analyze a repeating-process using common metrics, problem analysis, and improvements.
4. Understand how the components of a repeating process work together (system perspective).
5. Apply production planning, raw material ordering, delivery, and operations in a simulated environment.

# REQUIRED MATERIALS

1. Clothing Factory Software (McGraw Hill Practice Operations cloud simulation software link will be on Canvas, cost is roughly $60)
2. The Gold Mine: a novel of lean turnaround, Balle (this is the only book you need to buy) ISBN 0-9743225-6-3
3. Fundamentals of Manufacturing 3rd Edition, SME (I will post these materials on canvas as needed)
4. Case studies as assigned and posted on Canvas
5. Articles posted on Canvas
6. (optional) The Goal, Goldratt

# SCHEDULE

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| **Module** | **TOPIC** | **TEACHING METHOD** | **EVALUATION METHOD** |
| 1 | Intro leading edge manufacturing technologies | Videos, Reading Contemporary articles (The Economist MFG Segment) | HW Assignment & discussion |
| 2 | Manufacturing organizations | Lecture, Practice Operations Module 1 | Practice Operations 1, discussion |
| 3 | Process Maps | Lecture, Lucid Chart, HBS Operations Workbook | HW Process Maps |
| 4 | Introduction to Suppliers | Lecture, Practice Operations Module 2 | Practice Operations 2, discussion |
| 5 | Suppliers | Lecture, Practice Operations Module 2 & Supplier Score Card | Practice Operations 2, Supplier Scorecard, discussion |
| 6 | Process Analysis | HBS Car wash Simulation | Simulation report, 1 discussion |
| 7 | Sales, Forecasting | Practice Operations Module 3 | Practice Operations 3, discussion |
| 8 | Lean Toyota & GM and NUMMI | NUMMI Case Study, NPR episode | Case Study Report |
| 9 | Capacity Planning | Practice Operations Module 4 | HW Assignment, Excel Tool, 1 Discussion |
| 10 | Value Stream Maps |  | HW Assignment 5 |
| 11 | Plastics Processes | Textbook, lecture, videos, and factory tour (self or group) | Product identification and HW Assignment |
| 12 | Metals Processes | Textbook, lecture, videos, and factory tour (self or group) | Product identification and HW Assignment |
| 13 | Electronics Manufacturing | Textbook, lecture, videos, and factory tour (self or group) | Product identification and HW Assignment |
| 14 | Introduction to Quality | Textbook, lecture, videos | HW Assignment |
|  | Final Exam | Toyota Case Study, Practice Operations Final Module, New Manufacturing Process Presentation | Exam or Project |

# GRADING

25 % Final Exam or Final Project

50 % Homework, Discussions, & Case Study Assignments

5 % Participation

10 % Gold Mine Reading Report

10 % In-person manufacturing visit report(s)

# OTHER GUIDELINES

**LATE**

No late work. At all. Just hand in what you have when the due date arrives. If you need an extension it should be arranged before hand. The sooner the better.

**CHANGES**

If any change is needed to the course, the instructor will communicate those well in advance.

**FACTORY TOURS**

There are going to hopefully be some factory tours. They are usually really fun, and cool to see, and being students let’s us get into places a normal community member can’t. If you cannot attend the tours, then you are responsible for visiting or viewing the inside of a factory (either arranging your own tour of a factory, or a video tour online) and writing a report on them.

**LASTLY**

Have fun learning! If there is something in the general topic of manufacturing you want to learn about, ask me! If you have connections with local industry for tours, please also let me know.