# Industrial Engineering
## Mech 495
### *Instructor: F. Sassani*

Term: 2, Session: 2016-2017
Class days: Mon, Wed, and Fri
Class time: 8:00-8:50 am
Location: Earth Sciences Building, ESB 2012
(Please see the direction posted in ESB lobby on how to go to the second floor!)

Instructor Office Location: CEME 2057
Instructor Office Hours: After Mech 495 lecture, or e-mail: sassani@mech.ubc.ca

TA: Abbas Hosseini, e-mail: abbas.hosseini@mech.ubc.ca

*This course is an introduction to some of the principles and techniques used by Industrial Engineers to control and operate manufacturing and service systems. A complete study of Industrial Engineering would require four years of university training. In this course, you will become familiar with some of the most important IE concepts, and you will gain adequate knowledge of where and what to look for if you need to know more.*

## TOPICS COVERED

We hope to cover the following topics:


**Introduction.** *General Introduction to the course and Industrial Engineering.*

**Organizational Structure.** *Various modes of operation, fundamental guidelines; and communication.*

**Manufacturing Systems.** *Job-shop, batch and mass production. Line, functional and group technology (cellular) layout. Respective merits and demerits.*

**Classification and Coding.** *Group technology, part family formation methods, types of classification and their benefits. Opitz and other coding systems. Re-configuration of manufacturing systems.*

**Scheduling (sequencing) of operations.** *Single, two and three-machine N-job sequencing problems. General solution (Branch and Bound), scheduling/sequencing effectiveness criteria.*

**Forecasting**. *Various methods of trend forecasting including simple moving average, weighted average, linear and non-linear regression, and exponential smoothing.*

**Statistical Quality Control.** *Quality control for variables, quality control for attributes (defectives and defects).*

**Facility Location.** *Optimum placement of new facilities. Mathematical solutions to rectilinear, Euclidean, gravity and MiniMax problems.*

**System Reliability.** *Useful life of system components, reliability of parallel, series, and combined parallel-series systems. More complex systems and application of state and path enumeration methods; and sensitivity analysis.*

**Queueing Theory.** *Principles and application of queueing models, single and multi-channel queueing systems and their mathematical solutions.*

**Application of Principles.** *An introduction and review of the concepts of 5S, supply-chain management, six-sigma, and lean thinking.*

## Course Information

*Assignments***:** Several assignments will be given. The assignments must be handed in for marking. Use of the scientific software is not needed, though is possible for some assignments.

*Marking scheme*:

| | |
|---|---|
| Assignments constitute about | 20% |
| Mid-term Examination about | 30% |
| and Final Examination about | 50% of the reported grade. |
| Total | 100% |

To pass the course, the grade obtained in the final examination must be at least 50%. I would like you to be thinking about "obtaining first and second class standing" rather than ever thinking between "passing and failing"!

*Textbook***:** Industrial Engineering Foundations – bridging the gap between engineering and management. Farrokh Sassani. Publisher: Mercury Learning and Information, 2016. The book should be available through UBC bookstore in early January 2017.

Depending on the class progress, for which no issues are anticipated, the material in the textbook will be covered in its entirety.

*Note***:** In addition to the book, notes **should also be taken during the lectures** from the board. Instances to do so will be stated in the class. Other material relevant to the course (information, some additional assignments, supplementary notes, etc.) will be made available through the course CONNECT website.