IE 398 – Special Studies: Integrated Manufacturing Systems
Spring 2021

Instructor: L. Taner TUNÇ (ttunc@sabanciuniv.edu, Office: Online)
Mon: 08.40 – 09.30 Online Link: https://sabanciuniv.zoom.us/j/7933111536

Credits: 1

Objectives
Implementing the contents of IE402 course on a coding environment such as MATLAB. The students are expected to be able to perform simulations on machining processes.

Course Description
This course will include overview of MATLAB for general coding purposes. The theoretical content on CNCs and machining processes will be implemented on MATLAB. The fundamental components will include (i) cycle time prediction (ii) cutting force simulation, (iii) CNC motion, (iv) tool path computation for simple shapes, (v) performing statistical analysis on the collected signal data in machining processes.

References
- Chang, T-C., Wysk, R.A. and Wang, H-P., 'Computer-Aided Manufacturing' Prentice Hall (third edition), 2006
- J. Tlusty, 'Manufacturing Processes and Equipment', Prentice Hall, 2000.
- S. Kalpakjian and S.R. Schmid, 'Manufacturing Engineering and Technology', Prentice Hall.
- Y. Altintas, Manufacturing Automation, Cambridge, 2000.
- Groover, M.P., 'Automation, Production Systems and Computer-Integrated Manufacturing', Prentice Hall, 2001.

Tentative Schedule

Week	Topic
1	Introduction to IE398
2	Introduction to MATLAB
3	MATLAB coding structure
4	MATLAB Loops
5	Cycle Time Prediction in turning
6	Cycle Time Prediction in milling
7	Tool path computation in simple turning operations
8	Tool path computation in 2 ½ axis milling operations
9	Tool path computation in 3 axis ball-end milling operations
10	Converting tool paths to G-Codes
11	Converting tool paths to APT Codes
12	Simulation of cutting mechanics in turning
13	Simulation of cutting mechanics in milling
14	Statistical analysis in machining data

Labs

No exceptions!

Tentative Grading (To be decided)
1. Coding Assignments 15 %
2. Lecture Attendance 5 %
3. Project 20 %
4. Midterm (Based on coding practice) 20 %
5. Final exam (Based on coding practice) 40 %

Coding Project

Students are expected to complete a coding project to implement the coding background in the lectures. The students will develop a MATLAB code to

- Compute tool path for a simple geometry
- Generate G-Code for the computed tool path
- Calculate cutting forces, provided the material properties are known

Every student is expected to attend the project implementation, which will be announced later on.

1) **You must complete the Coding project or you will directly fail the course (F)**
2) **Plagiarism will not be tolerated in any submission relevant the course. Any attempt to plagiarism will result in an F grade.**