INSTRUCTOR : Dr. Ümit Bilge (M4025)
SCHEDULE : 2 h/week regular classes, 2 h/week laboratory study.
Prerequisites : IE306, IE201

Course Description:
This course focuses on modeling and simulation of flexible manufacturing systems and aims to introduce the students to the research conducted in BUFAIM- Flexible Automation and Intelligent Manufacturing Laboratory. After providing an understanding of the nature and context of flexible manufacturing systems, their components and the real-time operational decisions required for controlling such systems, the focus is set on the FMS simulator software developed and used in BUFAIM together with potential research areas. Using object oriented (OO) methodology the software is analyzed using reverse engineering approach and students are asked to design and implement some new features and enhancements that will give the software new directions for potential research. Students (individually or in teams) are expected to analyze the given case, come up with a good OO design, implement, verify and document their software, and present it.

Reference books & Other Material:
- Selected journal papers

Course Objectives:
- To introduce and discuss flexible manufacturing concepts;
- To have the students gain insight about the state-of-the-art research areas related to FMS and real-time shop floor control;
- To emphasize independent thinking as well as team work and facilitate the appreciation of the academic research;
- To have the students gain advanced skills in OO methodology and state of the art programming (C#);
- To have the students gain advanced skills in modeling, design and simulation of complex systems.

Topics Covered:
1. Definition of flexibility and Flexible Manufacturing Systems (2 classes)
2. Introduction to programming with C# (4 classes)
3. Simulation Software: Introduction and overview of FMS.NET architecture (2 classes)
4. Simulation Software: Object Model (4 classes)
5. Simulation Software: Sequence diagrams (8 classes)
6. Simulation Software: Decision logic (4 classes)
7. Mini-project: Simulating an FMS using FMS.NET (6 classes)
8. Simulation Software: Execution modes (6 classes)
9. Project: Problem definition and requirements analysis (2 classes)
10. Project: Design and development meetings (12 classes)
11. Project presentation and discussions (2 classes)

Grading:
- Attendance and contribution in class : 25 %
- Assignments& Mini-project : 20%
- Project content : 25 %
- Project documentation : 18%
- Project presentation : 12 %