

# **ESI 6529– Digital Simulation Techniques**

## **TERM PROJECT**

In this class, students are asked to do a term project. The purpose of the project is to help students better understand the modeling, data collecting, simulating, and analyzing techniques, learned in class, and how to use them to solve meaningful problems. Students may also gain some experience of scientific research.

Project teams will be formed in class during the fourth week of class with three students per team. Each team needs to find a real system and go through a complete modeling, simulating, and analyzing process. Project presentations will be scheduled in the last week of the semester.

List of suggested systems:

- Manufacturing systems
- Hospital emergency rooms and hospital pharmacies
- Warehouse facilities of 2500 square feet or more
- large restaurants or cafeterias
- Conveyor systems and material handling systems
- Transportation systems
- Grocery stores
- Arena Student Competition  
([https://www.arenasimulation.com/academic/iie-arena-student-competition/?Academics\\_Student\\_Competition.aspx](https://www.arenasimulation.com/academic/iie-arena-student-competition/?Academics_Student_Competition.aspx))

## **PROJECT DUE DATES**

- Tuesday, September 20: Each team turns in a page identifying members of team, with signatures of all team members. At most 3 members are allowed for each team.
- Thursday, October 18. Each team submits a project proposal (two typed pages in length) identifying choice of project, with contact information, description of the system, and project objectives.
- Project meetings will be scheduled on the weeks 14th).
- Week 15th, Project presentations (Tentative).
- December 6th, final project report due.

## **THE EVALUATION of PROJECTS**

Projects will be evaluated based on:

- The topic is interesting and/or important;
- The simulation study is complete: starting from data collection, input analysis, model building, validation, output analysis, until suggestions for improvement;
- The techniques used in the simulation modeling is novel without incurring unnecessary complication;
- The results will have some impact on the systems being studied;

- The presentation of the project is clear and instructive;
- Some extra nice features, such as good animation.

I encourage you to attend the presentation, because you can learn a lot from your classmates on the simulation studies for a variety of industrial and/or service systems.

## **PROJECT REPORT**

You must follow the outline below in writing your project report. The length of your report should be about 15 pages (not including the appendix). Your project report should be computer-printed. Pages must be numbered sequentially.

1. Title page. Include a project title, names of team members, course name, industry sponsors, and date.
2. Executive summary. This is a page summarizing the objectives, approach, and conclusions in non-technical terms.
3. Table of content.
4. System description and problem statement. Describe the system under consideration in details (be sure to include a detailed sketch of the system layout). State the problem that needs to be analyzed and resolved. State the objectives that you would like to accomplish.
5. Simulation model Building. Provide a detailed description of the model you adopt to analyze the problem. Explain all assumptions, variables, constraints, and objectives. What are the inputs and outputs of your model?
6. Model verification and validation. Justify that your model generates system behavior similar to that of the real-world system. Fully debug your program. Describe how you test your program for its correctness.
7. Input data collection and analysis. Describe your data collection procedure. Justify your data collection conditions. List the input data in tables and include in the appendix. Explain in details you input analysis procedure and results.
8. Simulation experiments. Outline and justify your simulation experiments design. Describe the simulation experiments you performed. What system conditions are you analyzing and how do they relate to your simulation objectives? Do you have a terminating systems or a non-terminating system? How did you decide on the number of simulation runs and run lengths?
9. Simulation output analysis. List you output data in tables or graphs. Perform output analysis to support your decision making on project conclusions and recommendations. Describe the procedure of your output analysis in detail. Present your results in tables or graphs.
10. Findings and accomplishments. Conclude your project by listing new findings and recommendations. Have you achieved the project objective? What recommendations can you make to the management to improve the system performance? Could you suggest any future work to further analyze the system?
11. Reference list. List references here.
12. Appendices. Put computer listings in appendices. Appendices must be titled and labeled.