IE 630
Simulation Modeling and Analysis
Spring 2024

Class hours: WF 9:30AM – 10:55AM, LC-002

Course URL: https://moodle.iitb.ac.in/course/view.php?id=6066

Instructor:
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Purpose: This course is designed to develop student's ability to *model* and *analyze* real *systems* using *discrete event simulation*. Through this course, the student will understand the power and characteristics of discrete event simulation modeling. During the course, the student will get experience in: (1) formulating an appropriate simulation model for a system, (2) implementing the model as a computer program, and (3) evaluating the output of the model. Interoperability issues of simulation with other applications, including database, will also be covered.

Text:
Discrete event system simulation. Banks, Jerry. Pearson Education India.

Simulation Modeling and Analysis, Law and Kelton, Third Edition, McGraw Hill, Boston, MA, 2000, ISBN 0-07-059292-6.

Simulation with Arena, W. David Kelton, et al, 6th edition, McGraw-Hill, 2014, ISBN 9780073401317.

Anylogic Software: AnyLogic provides a free Personal Learning Edition (PLE) for academic use. To download, visit www.anylogic.com and click on "Download Free PLE." Complete the registration form and verify your email to access the installer. Choose the version compatible with your operating system (Windows, macOS, or Linux), then install and log in using your credentials. Once installed, familiarize yourself with the interface, including the Project Explorer, Palette, Properties, and Canvas. Start by exploring tutorials available under "Help > Examples and Tutorials" to learn the basics of simulation modeling. Create your first model by selecting "File > New > New Model" and dragging components from the Palette onto the Canvas. Use the Properties panel to configure these components.
A significant component will be dedicated to hands-on learning with AnyLogic, a powerful simulation software widely used in industry and academia. Students will gain practical experience building models to analyze complex systems and simulate real-world scenarios. By the end of the

course, participants will be equipped with the skills to design and implement simulations for decision-making and system optimization.

Lecture Notes: Lecture notes will be uploaded early in the morning (at latest) on weekly basis.

Topics to be covered:
1. Introduction (definitions and types of simulations)
2. Mechanism of discrete event simulation
3. Review of probability and statistics
4. Random number/variate generation
5. Input data analysis (input distribution modeling)
6. Simulation modeling using Anylogic
7. Simulation output analysis
8. Monte Carlo simulation
9. Modeling continuous processes
10. Verification and validation of simulation models
11. Advanced Modeling techniques – ABMS, SD etc.

Work Required:
1. Exams: There will be a midterm and a final examination.
2. Homework/Quizzes: Homework will be assigned on a regular basis.
3. Final project: Final project will be performed as groups. Further information on the project will be provided in a separate handout in next few weeks.

Grading:
1. Homework/Class Participation/Quizzes: 20 %
2. Midterm Exam: 20 %
3. Final Exam: 35 %
4. Project: 25 %

Computer Usage:
1. Anylogic Simulation Package (major)
2. Java in Anylogic (minor)

Course Rules:
1. Homeworks need to be done individually unless otherwise mentioned.
2. Students are expected to attend lectures. The instructor reserves the right to give a pop quiz at any time.