

# ISyE 3044 (A): Simulation Analysis and Design

Term: Spring 2017  
Monday, Wednesday, Friday 10:05am-10:55am  
Instruction Center 209

## Instructor: Prof. Enlu Zhou

- Office location: Groseclose 327
- Office hours: appointment via email
- Email: [enlu.zhou@isye.gatech.edu](mailto:enlu.zhou@isye.gatech.edu)

## Teaching Assistant: Mr. Joshua Hale

- Office hours: Tuesday/Thursday 11am-12pm, or by appointment via email
- Office location: Main Building, room 224
- Email: [jhale32@gatech.edu](mailto:jhale32@gatech.edu)

## Course Objectives:

- General knowledge of simulation modeling and analysis (software-independent)
- Practical introduction to the Simio software

## Textbook:

- *Simio and Simulation: Modeling, Analysis, Applications*, 3<sup>rd</sup> Edition, W.D. Kelton, J.S. Smith, D.T. Sturrock, 2014. (referred to as "KSS" below)  
More information online: <http://www.simio.com/publications/Simio-and-Simulation-Modeling-Analysis-Applications-Edition-03/>. **You may want to purchase the electronic version of this book to save money. BE SURE TO GET THE 3<sup>RD</sup> EDITION.**

## Supplemental book:

- *Discrete-Event System Simulation*, 5<sup>th</sup> Edition, J. Banks, J.S. Carson, B.L. Nelson, D.M. Nicol, Prentice Hall, New York, 2010.

## Prerequisites:

- Knowledge of probability and statistics at the level of ISyE2027/2028. Random variate generation and analysis of simulation input and output require a variety of statistical tools.
- Stochastic processes and queueing theory at the level of ISyE 3232. The required concepts will be reviewed in an accelerated fashion.

## Topics:

We will cover selected chapters from the textbook (KSS) and some additional materials from lecture notes. The lecture notes will be posted on T-square. Each topic also comes with corresponding quizzes and/or Simio labs. Below is a tentative list of topics; the actual topics covered in class might be slightly different.

Topic 1	Introduction to Simulation (KSS Chapter 1)
Topic 2	Review of Probability (Lecture notes)
Topic 3	Basics of Queueing Theory (KSS Chapter 2)
Topic 4	First Simio Models (KSS Chapter 3-4)
Topic 5	Input Modeling and Analysis (KSS Chapter 6)
Topic 6	Working with Model Data (KSS Chapter 7)
Topic 7	Output Analysis (Lecture notes)
Topic 8	Optimization and Comparison via Simulation (Lecture notes)
Topic 9	Model Risk, Verification and Validation (Lecture notes)

## Grading Policy:

- Grade composition:
  - Homework assignments: 10%
  - Quizzes: 30%
  - Labs: 30%
  - Comprehensive final exam: 30%
- Homework assignments will be graded on a 0-2 scale: 0 for missing or incomplete assignments; 1 for almost or fully completed assignments with nontrivial mistakes; 2 for fully completed assignments with (almost) no mistakes. Homework assignments and their solutions will be posted at the same time on T-square. I strongly suggest you trying to complete the assignments on your own and only referring to the solutions when you have tried everything else (hard thinking, studying textbooks and lecture notes, discussing with classmates, etc.). When you take a peek at the solutions, try to only look for the step where you get stuck and then continue to work on the rest on your own.
- **There will be 3 quizzes.** Each quiz accounts for 10%. All quizzes are in class, closed book/notes.
- **There will be 4 labs.** Each lab accounts for 10%. The highest 3 scores out of 4 will be counted (so you can drop one lowest score). You will work on the lab assignment in class and should submit the lab report and Simio files on T-square **by the end of the class**, and just in case there is any network/computer issue you should submit by midnight of the same day with appropriate documentation and proof of the network/computer issue. All lab assignments should be **completed independently**; discussion with classmates or consult with TA is not allowed. No late submission will be accepted.
- **Missing quiz/lab:** Any missing quiz or lab will receive a score 0. There will be NO make-ups for missing quizzes and labs, regardless of your reasons of missing (sickness, time conflicts, etc.). However, the weights of these missing quizzes or labs will be moved to the final exam. For example, if you miss 1 quiz, the 10% weight of the missing quiz will be moved to the final exam so the final accounts for 40% now. If you miss only 1 lab,

this lab will be dropped. If you miss 2 or more labs, the 1<sup>st</sup> will be dropped and weights of the rest will be moved to the final exam.

- **Tip on getting good grades:** Attend and try to do well in every quiz and lab! The more you miss, the more weights (=pressure, risk) you put on the final exam. You all know putting all eggs in one basket is risky!
- **Regrading:** If the TA or I have made a mistake in grading a homework/quiz/lab, we will be happy to correct it. If a test is submitted for regrading, we have the right to regrade the entire paper (homework/quiz/lab) — so it is possible for you to lose additional points. Therefore, it is strongly recommended that you do not ask for regrading unless you have substantial reasons to believe that we made a mistake. All requests for regrading must be submitted with 7 days from when you receive the graded paper.

### **Tentative Dates of Quizzes/Labs:**

(Note: these dates are subject to change depending on the pace of the class, but they will vary by at most  $\pm$  one class)

1/25	Quiz 1
2/8	Quiz 2
2/20	Lab 1
3/3	Quiz 3
3/15	Lab 2
3/29	Lab 3
4/14	Lab 4

### **Assignment/Lab Policy:**

- All assignments and lab files must be submitted electronically to T-Square on time. Since connections may be unreliable, you should submit early and often. **NO** late submission will be accepted.
- It is your responsibility to **submit the correct and complete set of files** to T-square. Submitting the wrong file(s) or only part of the files will be considered as incompleteness of the assignment/lab.
- It is your responsibility to install Simio on your laptop and bring your laptop to lab sessions and classes that require Simio. Installation instructions will be given below.
- Technical questions will **NOT** be answered by emails, because mathematical expressions and simulation models are usually involved and hard to be fully explained in emails. You should come to TAs' or my office hours if you have those questions.
- We take honor codes very seriously. You can work together on homework problems, but you should write down your **OWN** solutions.
- If you have any special needs, please let me know within the first two weeks of the semester.

### **Classroom Policy:**

- Please be courteous to your instructor and classmates. The following behaviors are disrespectful and disrupting: talking/giggling about things unrelated to the class, walking out of class during a lecture, internet surfing, text messaging.
- If you have to leave during a lecture due to an important obligation, please let me know prior to the lecture.

- You should only open your laptop for class activities, such as building a model in Simio. If you have other class work, social networking or sports-score browsing that is more important to do, then please skip the class.
- Please always bring some scratch paper or a notepad to class. You will need it for doing some exercises in class.

### How to get Simio:

- Simio runs on reasonably new computers running the Microsoft Windows 7 and 8 operating systems. It also runs on Macintosh computers using an emulator (e.g., Parallels Desktop or VMware Fusion) on top of MAC OS X.
  - Additional Simio resources:
    - The introductory e-book Rapid Simulation Solutions: Introduction to Simulation and Simio is available from the Books menu in the Support ribbon of Simio.
    - The instructional labs at [www.simio.com/resources/videos/learning-simio-lab-series](http://www.simio.com/resources/videos/learning-simio-lab-series).
    - The site [www.simio.com/academics/student-resources.htm](http://www.simio.com/academics/student-resources.htm). This site is also accessible from the Videos menu in the Support ribbon.
  - There are three options to access Simio:
    1. Simio is installed on the computers in the Undergraduate lab.
    2. Simio is also available on [mycloud.gatech.edu](http://mycloud.gatech.edu) both on the virtual desktop and as an app. To use the latter, click on Apps and then click on the plus (+) sign on the left-hand side. Then click on ISyE Apps, and choose Simio as an add-on app. Keep in mind that the total number of concurrent users is limited to 250. Virtual applications depend on network connections and some objects may not display properly.
    3. Simio offers you the option to also install Simio on your own computer. Unlike other similar academic software, the Simio student edition is equivalent to the \$10,000 Simio Design Edition. The \$25 cost for one year of use includes a 600 page reference guide and the “Rapid Modeling Solutions: Introduction to Simulation and Simio” e-book. And you have access to all the training videos on the Simio web site. To purchase a license, follow the steps below:
      - Go to the link <http://www.simio.com/academics/order-academic-software/student-edition-order.php>. If the link does not work, make sure that it contains single hyphenation marks.
      - You should shortly receive a confirmation email. If you do not receive it within 1 hour, please check your junk mail folder as the email sometimes gets intercepted. If you use a different email for PayPal than your student email, check that PayPal email account (and its junk mail folder) as well. If you still cannot find the email, contact [customer\\_service@simio.com](mailto:customer_service@simio.com). Your license will be delivered within 1 business day.
      - Download and install the software and apply the activation code per the instructions in the email.
      - When prompted, enter the following information to complete the activation.
        - Pass Phrase: GATech\_2017
        - Pass Code: AC6691DC
- This will provide software good for one year from the purchase date.