

# INSY 6450/5450: Simulation-based Planning and Scheduling

## Spring 2022

**Instructor:** Jeffrey S. Smith, Ph.D.  
3306 Shelby Center  
[jsmith@auburn.edu](mailto:jsmith@auburn.edu)  
Office Hrs: TBD

**TA:** Grant Romine  
222 Gavin  
[ghr0001@auburn.edu](mailto:ghr0001@auburn.edu)  
Office Hrs: TBD

**Credit Hours:** 3

**Prerequisites:** Knowledge of discrete-event simulation and Simio (INSY 3420 or 7400 or equivalent).

**Meeting Time and Location:** Tuesdays 4:00 p.m. – 6:50 p.m., Shelby 1122. For any Zoom sessions that we have, the permanent address is <https://aub.ie/jsmith>. The “Class Schedule” page on Canvas will have the most up-to-date daily meeting plan. Most class meetings will involve a “flipped” component where completing a video-based module prior to the class meeting is required. For these classes, we will meet for approximately ½ of the scheduled time and the video module will cover the remaining time.

**Diversity & Inclusion, Health & Safety:** The overall well-being of all students, staff and faculty is a top priority with particular emphases on promoting health and supporting diversity & inclusion. Please refer to the last page of the syllabus for statements regarding these priorities.

**COVID-19 Alternate Operations:** If normal class activities are disrupted due to illness, emergency, or crisis situation (such as a COVID-19 outbreak), the syllabus and other course plans and assignments may be modified to allow completion of the course. If this occurs, an addendum to your syllabus and/or course assignments will replace the original materials.

### Course Text and Reference Material:

**Reference Text:** Smith, J.S. and D. T. Sturrock, *Simio and Simulation: Modeling, Analysis, Applications 6<sup>th</sup> Edition*, Simio LLC, 2021. Online version freely available at <https://textbook.simio.com/SASMAA/>.

**Simulation and Simio Video Module Series:** <https://jsmith.co/educational-modules/> - Learning Simio Lab Series, Simio Models/Examples, General Simulation Models, Simulation and Simio.

**Reference Text:** Law, A. L., *Simulation Modeling and Analysis, 4th Edition*, McGraw-Hill, New York, NY, 2006.

**Simio Software:** Version 14.232 or later (<https://cdn.simio.com/software/Simio-14.232.25517.zip>)

**Course Description** A graduate/undergraduate course in simulation-based planning and scheduling. Topics include intermediate simulation modeling, dispatching and scheduling methods, and implementation of scheduling systems and supply chain planning systems using a commercial simulation software package.

**Course Objectives:** Upon completion of this course students should:

1. Understand and have experience using several intermediate simulation topics such as processes, tokens, data tables, table relationships, data-generated models, and materials and inventory
2. Understand the dispatching method for scheduling
3. Understand the ISA95/B2MML standards for representing manufacturing data
4. Understand and have experience implementing simulation-based scheduling models using the Simio commercial simulation package.

- Understand and have experience implementing supply chain planning models using the Simio commercial simulation package.

**Course Topics (by week – Subject to adjustment as the semester progresses):**

- Course introduction and simulation/Simio refresher, Case Study 1
- Scheduling, Dispatching, and Schedule Generation, Initial job shop models
- FMS Design + Operation exercise, Case Study 2
- Using Simio Task Sequences, Setups and secondary resources
- Materials, Inventories, and Bills of material (BOM), Case Study 3
- Using the ISA 95 Template
- Exam 1
- Simio RPS, Case Study 4
- Data logs and dashboards
- Industry 4.0 and digital twins
- Supply Chain models, Case Study 5
- Supply Chain models Case Study 5
- Case Study 5
- Exam 2

**Course Requirements/Evaluation:**

<i>Item</i>	<i>Due Date</i>	<i>Weight</i>
Exam 1	On or around 3/1/22	20%
Exam 2	4/26/22, 4:00 p.m. – 6:30 p.m.	20%
Case Studies (5)	Various	50%
Class Participation	Various	10%

In-class exams will be closed-book and closed-notes and will be held during the regularly scheduled class period. Makeup exams will be given only with a TigerCub-approved excuse or prior instructor approval. If you miss an exam, you must contact me within two calendar days of the missed exam. Note that job interviews are not TigerCub-approved excuses – when in doubt, you should check with the instructor *beforehand*.

Case studies will be important parts of the class and you should work alone on all assignments unless otherwise stated in the written assignment. You can and should discuss certain aspects of the assignments with your classmates, but you must complete these by yourself and turn in only your own work. All assignments should include a formal write-up and should not be hand-written (i.e., use a word processor). *Late case studies will be penalized by 50% per calendar day.*

Class participation is an important component of this class – note that it represents the equivalent of one letter-grade. Methods of “participation” for this class include in-class discussion/questions, emailed questions/discussion, discussions on Canvas, and ad-hoc Zoom meetings with the instructor and/or TA. Note that the participation component applies to all students – on-campus and off-campus. The best way to get full participation credit is to actively participate throughout the semester.

Grading will be on a standard 10-point scale with the instructor’s option to curve any of the individual exam grades.

**Class Policy Statements:** There will be no unannounced quizzes.

**Calculator Policy:** As stated in the Tiger Cub, any violation of the academic honesty code will be reported to the Academic Honesty Committee. To avoid academic dishonesty, students are not to have calculators that store text and/or can connect to Bluetooth devices during class.

**Disabilities:** Any student with a disability needing special accommodation should notify the instructor and contact the Office of Accessibility, located in 1244 Haley Center.

**Justification for Graduate Credit:** Simulation has been established as a very important system analysis methodology. This course covers significantly more material than does the undergraduate simulation course and includes more advanced input/output analysis, and more comprehensive focus on performance analysis.

**Academic Honesty:** All portions of the Auburn University student academic honesty code (Title X11) found in the Tiger Cub will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee. Violations include, but are not limited to:

1. *Cheating on an examination* - This includes such things as copying from another's paper, using unauthorized notes, calculators, etc., or giving or receiving unauthorized aid, such as trading examinations, whispering answers, passing notes, or using electronic devices to transmit or receive information.
2. *Plagiarism* - This is using someone else's work without giving credit. It is, for example, using ideas, phrases, papers, laboratory reports, computer programs, data - copied directly or paraphrased - that you did not arrive at on your own. Sources include published works such as book, movies, web sites, and unpublished works such as other students' papers or material from a research service. In brief, representing someone else's work as your own is academically dishonest. The risk of plagiarism can be avoided in written work by clearly indicating, either in footnotes or in the paper itself, the source of any major or unique idea or wording that you did not arrive at on your own. Sources must be given regardless of whether the material is quoted directly or paraphrased.

*Copying another student's assignment and putting your name on it is plagiarism.*

3. *Unauthorized collaboration* - This is working with or receiving help from others on graded assignments without the specific approval of the instructor. If in doubt, seek permission from the instructor before working with others. Students are encouraged to learn from one another: Form study groups and discuss assignments, but each assignment must be individual work unless specifically stated and turned in as a group assignment. You are encouraged to talk to one another about your assignments, however, all assignments must be done by the student(s) whose name is (are) on it!
4. *Multiple submission* - This means using the same work to fulfill the academic requirements in more than one course. Prior permission of the instructors is essential.

**Diversity & Inclusion Statement:** It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, religion, sexuality, disability, age, socioeconomic status, veteran status, ethnicity, race, and culture. All students in this course are expected to respect their fellow classmates and actively participate in fostering an inclusive learning environment. If you experience anything in this class that makes you feel uncomfortable, please bring it to my attention and we will formulate

a response. If you would prefer to remain anonymous you may complete a Bias Incident Report which will maintain your confidentiality at: <http://studentaffairs.auburn.edu/bert/submit-a-report-of-bias/>. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.