

Georgia Institute of Technology

Course Syllabus: INTA 6742 OCY/O01: Modeling, Simulation, and Military Gaming

Spring 2021 Section OCY/O01	MS in Cybersecurity MS Computer Science
Delivery: 100% Web-Based, Asynchronous	Canvas Content Delivery
Dates: January 14 – April 27, 2021	

Instructor Information

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Weekly Office Hours via Blue Jeans Weekly Monday, 8-9pm	Teaching Assistants: Chandler Thornhill chandlerthornhill@gatech.edu Second TA TBD

General Course Information

Description

Computer modeling and simulation offers a unique perspective on events because of the ability to hold some variables constant and change others, and run a scenario repeatedly searching for underlying themes. This facilitates an understanding of the cumulative impact of seemingly minor events on grand outcomes. Computer simulation has been used as an analytical tool in the natural sciences, business, commerce, government and politics.

This course focuses on the creation and application of computer simulations to model strategic international events concerning warfare. The course is project-based, requiring computing and international affairs students to work together in multidisciplinary teams to analyze specific questions utilizing computer-based modeling and simulation tools (largely, but not exclusively “NetLogo”). The students will collaboratively define and evaluate specific questions in international events, formulate hypothesis concerning the resolution of these questions, develop modeling and simulation software to aid in an analysis, and apply the tools to test hypotheses and formulate conclusions from this investigation.

The learning objectives will be accomplished in the context of a specific wargame scenario. For example, a team interested in World War I might focus on the German Schlieffen Plan. This was Germany's plan for the invasion of France through Belgium and Luxembourg in 1914, at the beginning of the Great War, that subsequently was halted at the First Battle of the Marne, six

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weeks after the war began. There has been 100 years of debate over the reasons that the plan failed, and this debate continues among scholars today. Through computer simulation the group would replicate the plan (or some portion of the plan) and test a particular explanation given for the plan's failure.

Alternatively, student teams could analyze battles from antiquity, the gunpowder age, or the 20th Century. It may also include potential future scenarios, such as the use of anti-satellite weapons in future conflict. Simulations from previous classes included Gaugamela (Alexander the Great vs Darius), Zama (Scipio vs Hannibal), Cannae (Hannibal vs Roman Legions), Bunker Hill, Gettysburg, Tarawa, and the US Marines' retreat from the Chosin Reservoir (Korean War).

Pre- and/or Co-Requisites

None

Course Goals and Learning Outcomes

Upon successful completion of this course, you should be able to:

- Demonstrate the ability to formulate specific study questions concerning international events and formulate hypothesis that can be tested through experimentation with computer simulation tools.
- Develop an understanding of the capabilities and limitations of modern modeling and simulation techniques as applied to the analysis of strategic international events.
- Demonstrate an understanding of accepted methodologies and practices concerning the creation and use of computer simulations to study international events to derive reasoned and justifiable conclusions.
- Demonstrate an understanding of the underlying models, abstractions, and software realizations used in modern wargame simulations.
- Demonstrate an understanding of the basic software architecture and elements of modern wargame simulations.
- Demonstrate the ability to communicate complex concepts to multidisciplinary teams including students from computing and international affairs backgrounds.
- Demonstrate the ability to understand and incorporate concepts from a different discipline and integrate them in the development and use of wargame simulations.
- Demonstrate the ability to collect and incorporate data from historical and other records for use in wargame simulation tools.
- Students will be proficient in basic mathematical skills and be able to formulate problems in international affairs mathematically if appropriate. Use software, process and analyze information, quantitative and qualitative methods.

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Course Materials

These books are optional, but I will occasionally reference them throughout the class as sources to consult if you're looking for additional guidance. I also encourage you to find additional sources outside of these to broaden your understanding of these topics.

- Wilensky, U., & Rand, W. (2015). *An introduction to agent-based modeling: modeling natural, social, and engineered complex systems with NetLogo*. MIT Press.
- Tolk, Andreas. *Engineering principles of combat modeling and distributed simulation*. John Wiley & Sons, 2012.
- Sabin, P. (2012). *Simulating war: Studying conflict through simulation games*. A&C Black.
- Biddle, Stephen D., and Stephen D. Biddle. *Military power: Explaining victory and defeat in modern battle*. Princeton University Press, 2004.
- Keegan, John. *The face of battle: A study of Agincourt, Waterloo and the Somme*. Random House, 2011.

Course Website and Other Classroom Management Tools

This class will use Canvas to deliver course materials to online students.

Assignment Distribution and Grading Scale

Here is a list of the assignments and activities required in the course. Grading is not “curved;” students will be graded based on how well they have met the requirements of the assignment and accomplished specific learning objectives. Most assignments will have a rubric associated with them so that students can see what criteria are used for grading and what weight is given to them.

Assignment	Weight
Short Assignments (27)	20%
Interim Presentations (4)	20%
Contribution to Team (Based on Peer Review by Teammates) (1)	20%
Final Presentation/ Product (1)	40%

Assignment Submission and Due Dates

Each assignment will have a separate entry in Canvas that explains in more detail what is expected, when it is due, and what criteria are used to grade it. The weighting of the different assignments in determining your final grade is clear from the table above. Most assignments will

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be finalized by the student uploading a file in the relevant assignment place in Canvas. Do not send assignments directly to the professors or TA's via email. All assignments must be submitted within Canvas, otherwise they cannot be graded properly and do not count towards the grade. Late work is not accepted. If there are technical issues, please notify the help desk, as well as each professor immediately.

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Keep in mind that a B average is required to graduate from the program.

Technology Requirements and Skills

To participate in this class, you need the following computer hardware and software:

- Broadband Internet connection
- Laptop or desktop computer with a **minimum** of a 2 GHz processor and 2 GB of RAM
- Windows for PC computers or Mac iOS for Apple computers.
- Complete Microsoft Office Suite or comparable applications and ability to use Adobe PDF software (install, download, open and convert)
- Mozilla Firefox, Chrome and/or Safari browsers

Technology Help Guidelines

30-Minute Rule: When you encounter struggles with technology, give yourself 30 minutes to 'figure it out.' If you cannot, then post a message to the discussion board; your peers may have suggestions to assist you. You may contact the Helpdesk 24/7. When posting or sending email requesting help with technology issues, whether to the Helpdesk, message board, or the professor use the following guidelines:

- Include a descriptive title for the subject field that includes 1) the name of course 2) the issue.
- List the steps or describe the circumstance that preceded the technical issue or error. Include the exact wording of the error message.
- When possible, include a screenshot(s) demonstrating the technical issue or error message.
- Also include what you have done to try to remedy the issue (rebooting, trying a different browser, etc.).

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Communication Policy

Questions and comments can be posted on piazza. Email personal concerns, including grading questions, to the professor privately using the piazza private message feature or email. Do NOT submit posts of a personal nature to the discussion board. The TAs and I will do our best to respond to questions within 24 hours.

Virtual office hours will be held using Bluejeans. I will hold Virtual Office Hours every Monday from 8-9pm I am also happy to schedule one-on-one office hours via Blue Jeans, as needed. For questions related to technology, please contact: <https://b.gatech.edu/digitallearningsupport> for assistance.

Online Student Conduct and Netiquette

Communicating appropriately in the online classroom can be challenging. In order to minimize this challenge, it is important to remember several points of “internet etiquette” that will smooth communication for both students and instructors:

Read first, Write later. Read the ENTIRE set of posts/comments on a discussion board before posting your reply, in order to prevent repeating commentary or asking questions that have already been answered.

Avoid language that may come across as strong or offensive. Language can be easily misinterpreted in written electronic communication. Review email and discussion board posts *before* submitting. Humor and sarcasm may be easily misinterpreted by your reader(s). Try to be as matter of fact and professional as possible.

Follow the language rules of the Internet. Do not write using all capital letters, because it will appear as shouting. Also, the use of emoticons can be helpful when used to convey nonverbal feelings.

Consider the privacy of others. Ask permission prior to giving out a classmate's email address or other personally identifiable information.

Keep attachments small. Avoid gigantic files; if it is necessary to send pictures, minimize the size.

Problem posts. Do not spam your classmates or instructors. The instructor reserves the right to remove posts that are not collegial in nature and/or do not meet the Online Student Conduct and Etiquette guidelines listed above.

University Use of Email

A university-assigned student e-mail account is the official university means of communication with all students at Georgia Institute of Technology. Students are responsible for all information sent to them via their university-assigned e-mail account. If a student chooses to forward information in their university e-mail account, he or she is responsible for all information, including attachments, sent to any other e-mail account. To stay current with university information, students are expected to check their official university e-mail account and other electronic communications on a frequent and consistent basis. Recognizing that some

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communications may be time-critical, the university recommends that electronic communications be checked minimally twice a week.

Plagiarism & Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. All students enrolled at Georgia Tech, and all its campuses, are to perform their academic work according to standards set by faculty members, departments, schools and colleges of the university; and cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404) 894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and students. See the GT [catalogue](#) for an articulation of some basic expectation that you can have of me and that I have of you. In the end, respect for knowledge, hard work, and cordial interactions will help build the environment we seek. I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Subject to Change Statement

The syllabus and course schedule may be subject to change. Changes will be communicated via the Canvas announcement tool or the class Piazza discussion forum. It is the responsibility of students to stay current.