Georgia Institute of Technology

ASE 6006 Systems Engineering Laboratory Syllabus

Spring 2027

Delivery: 100% Web-Based, Asynchronous

Dates course will run: March 8, 2027 – May 2, 2027

Instructor Information

Dr. Chris Cordell, Email: christopher.cordell@gtri.gatech.edu

Mentors: CJ Escobedo, Nathan Thompson

Office Hours: Weekly office hours via Zoom. Attendance is optional but highly encouraged.

General Course Information

Description

In this course, students will apply a working knowledge of Systems Engineering techniques, processes, and tools to a particular case study. Students will gain experience in exercising the full Systems Engineering "V" diagram through work driven by a course-long project, including the application of Model Based Systems Engineering throughout the design process. This course is primarily group-driven, where students will also exercise "soft skills" to organize their teams and work together toward a common goal.

Pre-Requisites

This course does not have any prerequisites aside from its location within the sequence of courses defined in the program. This course follows ASE 6005 in the PMASE curriculum.

Course Goals and Learning Outcomes

By the end of the course, students will be able to:

- Apply Systems Engineering (SE) concepts and tools in the management of an evolving project.
- Coordinate the design of a complex system within a self-organized team.
- Develop an SE approach within a modern Model-Based Systems Engineering (MBSE) environment.

Course Materials

Course Text

There is no required textbook for this course. All reference material will be provided through the course website.

Additional Materials/Resources

There will be no other physical material. All resources will be available through the course website and the virtual lab machine provided to the students.

Course Website and Other Classroom Management Tools

All course content will be provided through Canvas.

Course Requirements, Assignments & Grading

Assignment Distribution and Grading Scale

Assignment	Release Date	Due Date	Points	Weight
Weekly Individual Labs	**-**	**-**	**(395)**	**25%**
Lab 1: Analytic Hierarchy Process		March 22	90	-
Lab 2: TOPSIS		April 5	100	-
Lab 3: Regression Modeling with JMP		April 12	50	-
Lab 4: Optimization		April 19	80	-
Lab 5: Robust Design		April 26	75	-
Weekly Group Labs	**-**	**-**	**(710)**	**40%**
Lab 1: Voice of the Customer		March 15	130	-
Lab 2: Voice of the Engineer		March 22	115	-
Lab 3: Architecture Design		April 5	130	-
Lab 4: Component Selection		April 12	90	-
Lab 5: System Integration		April 19	130	-
Lab 6: Verification and Validation		April 26	115	-
Project Presentations and Reports	**-**	**-**	**(550)**	**35%**
Preliminary Design Review		April 3	100	-
Initial SEMP Generation		April 12	50	-
Operational Readiness Review		April 30	100	-
Final SEMP Document		May 2	100	-
Final SysML Model		May 2	200	-

Grading Scale

For each graded section, the total number of points will be added across all lab assignments. The percentage of points earned in that section then makes up the assigned percentage of that section toward your overall grade.

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%

Description of Graded Components

Rubrics for each assignment are provided in Canvas that detail the point allotment for the tasks expected for completion of each exercise.

Individual labs are intended to be performed by each student independently and are meant to provide exposure to various SE tools that are introduced during the course. Individual labs are

due by the posted due date for the possibility of full credit. If an individual lab is turned in within 24 hours after the due date, it will still be graded with 10 points deducted for being late. If the assignment is any later than that, it is not graded and counts as zero points toward the individual lab section. Each student submits their own response to this lab through the course website.

Group labs are intended to be performed by each assigned team of students. Teams work independently of each other in developing their own system models. Group labs are due by the posted due date, where the due date is based on the date of model commit for the revision number provided on the course website submission page. Each group provides a single submission for the group (i.e., only one student needs to submit for their team). Labs will be submitted and graded through the SysML model for each team through defined lab assessment pages that have been setup. The submission on the course website for these labs will contain the revision number for the model that corresponds to the version you wish to have graded.

Project presentations and document generation will occur throughout the course. They are graded based on the contents of the presentation or document, with presentations occurring to the entire class by each team. The submission through the course website will contain the model revision number that was presented. Project final deliverables are due by the posted due date on the course website. For the final SysML model, there is no submission directly within the model. Instead, each team will provide the final revision number of their model that they wish to have graded as the final deliverable.

Submitting Assignments

All assignments (homework, knowledge checks, exams etc.) must be completed and submitted within Canvas. Sending assignments (homework, knowledge checks, exams etc.), whether early, on time, or late to the professors is not permitted and will not be accepted. If there are technical issues, please notify the help desk, as well as the professor immediately.

Assignment Due Dates

All assignments will be due at the times listed above. These times are subject to change so please check back often. Please convert from Eastern Time to your local time zone using a Time Zone Converter.

Late and Make-up Work Policy

As mentioned previously, all labs are due by the posted due date. Group lab submission performed through the SysML model are judged on-time based on the time of last commit for the specified revision that the team wishes to have graded. Group lab submissions through the course website only need to contain this revision number. Individual lab submissions are submitted through the course website. There is a 10-point penalty for submission with 24 hours after the due date. Any individual labs submitted later than that are not graded and result in a zero for the assignment.

Extensions and Late Assignments

The general course policy is that no assignments are rescheduled, and late assignments are only graded per the late assignment policy mentioned earlier. To reiterate, there is a point penalty for late submissions of individual labs within 24 hours of the due date. Any individual assignment submitted after that time, or any group lab whose model commit time is after the due date, is deemed as a zero.

In the event of extreme technology issues, extensions to lab due dates may be made. Note that this applies to a course-wide affector, such as the VLab being unavailable for an entire weekend. Individual limitations or short-term outages are not appropriate reasons for extensions. In the event an individual has a significant event that affects their ability to meet course deadlines, accommodations will be considered.

Grading and Feedback

Group lab assignments will be graded by the Friday of the week they are turned in. Individual lab assignments will be graded by the office hours that week. Presentation assignments will be graded within two days after the presentation. Final course deliverables will be graded within the week after they are submitted.

Technology Requirements and Skills

Computer Hardware and Software

You will need a computer and internet able to access the PMASE Virtual Desktop, course website, Zoom live sessions and office hours, and collaboration meetings with your team. If you have previously installed the MSOSA SysML software on your personal machine for use in ASE 6005, it should still be applicable to this course as well. This software is available through VLab for those students who need to access it there. All other course software is also available through VLab. There is not a direct requirement for Microsoft Office or comparable tools (which are also available through VLab), though students may decide to perform some assignments using these tools on an as needed basis.

Technology Skills

Students should have basic computer skills, such as navigating a web browser, monitoring email, and so on. All software used for assignments is introduced through the course material. Students should have knowledge of and capability with the MSOSA SysML software, as this is the primary tool that group assignments will be collaboratively worked in. Students in this course will have had an entire course dedicated to that tool through ASE 6005, the course prior to this one in the PMASE curriculum.

Onboarding Quiz and Proctoring Information

All Georgia Tech online degree and certificate students are required to complete the Onboarding Quiz with Honorlock in the first week of the course. Honorlock is utilized for student identity verification and to ensure academic integrity. Honorlock provides student identity verification via facial and ID photos. You may also be asked to scan the room around you. The Onboarding Quiz is needed to help make sure that your identity is verified and that your system is set up to work with Honorlock online proctoring tool. You are required to complete this quiz early in the semester to avoid problems when taking proctored exams.

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 are also directed to contact the Helpdesk 24/7.

When posting or sending email requesting help with technology issues, whether to the Helpdesk, message board, or me use the following guidelines:

- Include a descriptive title for the subject field that includes 1) the name of course 2) the issue. Do NOT just simply type "Help" into the subject field or leave it blank.
- List the steps or describe the circumstance that preceded the technical issue or error. Include the exact wording of the error message.
- When possible, always include a screenshot(s) demonstrating the technical issue or error message.
- Also include what you have already tried to remedy the issue (rebooting, trying a different browser, etc.).

Course Policies, Expectations & Guidelines

Communication Policy

- Please email personal concerns, including grading questions, to the instructor and your team's assigned mentor. Please do NOT submit posts of a personal nature to the general course discussion board.
- Please post general course questions to the course discussion board rather than emailing the instructor and/or mentors. This allows all students to see what a common question may be, reduces the repetition required to answer similar questions, and maintains consistency of response.
- If you see that a question that has been posed on the discussion board is something you can answer or provide detail toward, feel free to reply. Instructors and mentors will have alerts activated for the discussion board but may not be able to address questions immediately.
- Any questions in the public discussion board or emails with private concerns will be answered or addressed in a timely manner. This means that you can expect at least an acknowledgment, if not the entire answer within a day or less depending on when the request was made.
- During the week, email will be checked actively during working hours in the Eastern time zone (from 8 am – 5 pm). You can also expect the instructor to check email at least once each evening in case questions were asked later in the day. On the weekends, the instructor and mentors will check email at least twice per day.
- Virtual office hours will be held through the course web meeting platform, currently Zoom. Office hours will be recorded, and recordings will be available between 24 and 48 hours in the course Media Gallery.
- For questions related to technology, please see the course website for the appropriate contacts. Different personnel support Canvas issues as compared to VLab issues for example.
- For questions related to technology, please contact the Digital Learning Support team for assistance at https://b.gatech.edu/digitallearningsupport.
- To request help from the PMASE Academic Support staff please submit a ticket at https://pe.gatech.edu/degrees/pmase/request-academic-support. For technical support with VLab, please email pmase.support@gatech.edu.
- You can reach the Canvas Hotline by phone at 1(877) 259-8498 or by email at support@instructure.com.

Online Student Conduct and (N)etiquette

Although it is not expected to be a problem in a graduate-level class, students are asked to behave in the discussions and other class interactions professionally and civilly. If you are in doubt, do not post it! Instructors reserve the right to remove any postings deemed inappropriate, unprofessional, or otherwise distracting from the course.

University Use of Electronic 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 to 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 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/.

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

Attendance and Participation

Attendance in this course is not part of the grade. It is expected that all students attend the virtual live sessions. Office hours are optional; however, it is strongly recommended you attend so that you are more quickly aware of questions answered during the session and can ask your own.

Participation in the course is judged through each student performing the individual labs and contributions to the group project. It is generally not expected that every student provides the exact same percentage of work within the group, as that is difficult to assess. However, it is eminently obvious to the casual observer when a student is not participating. If a group feels that one or more of their members are not participating, the group should follow these steps:

1. Work within your group to address the situation as possible.
2. Reach out to the instructor and your team's assigned mentor, explaining the situation so that they can facilitate a discussion with the group to address the concern.
3. Monitor the situation for resolution or continued issue.

Since this is a distance learning course, it is expected that not everyone's schedule perfectly aligns with contributing equally each week. If your team agrees on a strategy, for example a student who cannot contribute as much one week picks up more work the next, then the instructor will deem everyone as having participated. If a significant lack of participation is found throughout

the course for one or more students, and resolution activities do not alleviate the issue, then the instructor will consider grade repercussions on an as-required basis.

Collaboration & Group Work

Individual lab assignments are meant to be performed by each student independently. It is acceptable to ask each other how to resolve an issue you are having, but the work must be performed by each student on their own. Group lab assignments should be performed by your assigned team. This course does allow for open communication between teams, where teams can communicate with each other to resolve model issues or determine how one team used an interesting new feature that others would like to use. It is unacceptable for one team to directly copy model elements or other group response from another team.

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 to set up a time to discuss your learning needs.

Copyright

Among the materials that may be protected by copyright law are the lectures, notes, and other material presented in class or as part of the course. Always assume the materials presented by an instructor are protected by copyright unless the instructor has stated otherwise.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. See https://catalog.gatech.edu/rules/21/ for an articulation of some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, 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 and email. It is the responsibility of students to check email messages and course announcements to stay current in their online courses.

Course Schedule

Week	Module	Lessons	Activities
Week 1 March 8 – March 14	***Welcome Module*** ***Module 1*** Stakeholder Requirements Definition	1: Systems Engineering Overview 2: Life Cycle 3: Voice of the Customer 4: Unified Architecture Framework 5: Risk 6: Modeling Needs with Requirements 7: Course Project Introduction 8: Course Virtual Material Introduction	Office Hours Live Session ***Group Lab 1***: Voice of the Customer
Week 2 March 15 – March 21	***Module 2*** The Voice of the Engineer	1: Mission Architecture 2: Voice of Engineer 3: Requirements Traceability 4: Requirements Prioritization 5: Use Cases 6: Model Organization 7: Use Case Modeling 8: Requirements Modeling 9: Analytic Hierarchy Process 10: House of Quality	Office Hours ***Individual Lab 1***: Analytic Hierarchy Process ***Group Lab 2***: Voice of the Engineer
Spring Break			
Week 3 March 29 – April 4	***Module 3*** System Architecture Design	1: Architectural Design 2: Baseline Mission 3: Behavior Modeling 4: Trade Studies 5: Architecture Modeling 6: Functional Decomposition 7: Automatic Document Generation 8: Morphological Matrix 9: TOPSIS	Office Hours Live Session ***Individual Lab 2***: TOPSIS ***Group Lab 3***: Architecture Design ***Preliminary Design Review***
Week 4 April 5 – April 11	***Module 4*** Component Analysis and Selection	1: Performance Analysis 2: Architecture Selection 3: Design of Experiments 4: Regression Modeling 5: Capturing Analysis Results 6 & 7: Model Center: Analysis 8: Model Center: DOE 9: JMP	Office Hours ***Individual Lab 3***: Regression Modeling with JMP ***Group Lab 4***: Component Selection ***Initial SEMP Generation***

Week	Module	Lessons	Activities
Week 5 April 12 – April 18	***Module 5*** Integrated Systems	1: Integrated Systems 2: Optimization 3: Effects of Constraints 4: Modeling Integrated Systems 5: Modeling Information Flows 6: Genetic Algorithm 7: Model Center: Optimization	Office Hours ***Individual Lab 4***: Optimization ***Group Lab 5***: System Integration
Week 6 April 19 – April 25	***Module 6*** Robust Design and System Transition	1: Transition to Operation 2: Verification and Validation 3: Robust Design 4: Capturing V&V 5: Taguchi Method 6: JMP: Robust Design	Office Hours Live Session ***Individual Lab 5***: Robust Design ***Group Lab 6***: V&V
Week 7 April 26 – May 2	***Module 7*** Transition to Fabrication and Operation		Office Hours Live Session ***Operational Readiness Review*** ***Final SEMP Document*** ***Final SysML Model***