# AE6394 System of Systems Engineering Applications Spring 2021 Syllabus

**Course Instructor**
Prof. Dimitri Mavris
`dimitri.mavris@aerospace.gatech.edu`
Office Hours: by appointment
Office: Weber 301A

AE6394 for 4 credit hours in the course catalogue of the Georgia Institute of Technology. Lectures take place between TBD times in the TBD building in TBD lecture room unless otherwise specified by the instructor or the assistants.

## 1    Introduction & Objective

System of Systems Engineering Applications is a 4-credit course covering methods related to the study, development, analysis, and design of complex systems and systems of systems. Lectures will cover each method by introducing its theoretical formulation, application criteria, and some example applications. The goal of the course is not to provide comprehensive coverage of each method, but to provide sufficient fundamental coverage of it to allow for the practical use of the methods on the group project. Another goal is to get students initiated with the methods to ease future self-learning.

The main objective of this course is to provide the student with hands-on experience in applying system of systems engineering knowledge to a realistic engineering problem. Teams will continue their Grand Challenge Projects from the previous semester (AE6393). Simulation execution and documentation challenges will be covered in the lectures strengthening the material from AE6393. Projects include engineering problems of interest to industry and government organizations.

## 2    Class Projects and Assignments

Groups will be determined during the previous semester as part of the AE6393 course. Students will continue their projects into the Spring semester. This will be a hands-on

experience on design methodologies and tools with supporting lectures. Progress on these projects will be assessed by progress reports and in-class presentations by the team to the instructor and assistants. Dates for deliverables and presentations will be provided through the course website.

# 3    Grade Breakdown

Grades will be mainly based on lab participation, project presentations, and final report. There will be a single semester-long, team project which the report and the reviews will be based on. The detailed breakdown is given below in Table 1.

| Week | Grade Ratio | Title |
|------|-------------|-------|
| — | 50% | Project Reviews |
| 15 | 25% | Final Report |
| — | 25% | Lab Exercises |

Table 1: Grade Breakdown

# 4    Class Website

The official SoSE Applications class website is on Canvas at https://canvas.gatech.edu/. This website is intended to provide all official lecture material, handouts, presentations, notices and relevant information. Note that the website will be constantly updated and must be checked on a regular basis. All announcements are automatically emailed to your GT student account. It is the student's responsibility to maintain access to this account and address email filtering issues. To log in use your GT account username (usually your first name initial followed by your last name and a number, e.g., *gburdell3*) and your GT account user password. Once on Canvas, select the AE6394 course. Distance Learning students can access lecture videos through this website.

# 5    Office Hours

Prof. Dimitri Mavris will hold office hours by appointment in Weber 301A.

# 6    Honor Code

Students are expected to abide by the Honor Code of the Georgia Institute of Technology. Information on the Honor Code can be found at `http://www.honor.gatech.edu/`. It is the responsibility of the students to become familiar with the Honor Code and be aware of

rules and expectations. If you have any questions regarding the Honor Code please contact a representative of the Honor Advisory Council of the Institute. Violations to the Honor Code have serious consequences and will be enforced at all times.

# 7   School Calendar

The official school calendar of Georgia Tech is provided by the Office of the Registrar and is available at http://www.registrar.gatech.edu/home/calendar.php.

# 8   Student Expectations

## 8.1   Class Material Documents

Students are expected to complete reading assignments before lectures. It is the student's responsibility to understand the material to the best of his/her abilities before the lecture; the student may use the class material documents and any additional sources necessary. If a student is new to a certain topic it is his/her responsibility to become familiar with it outside lecture time. Class assistants will be available to help students in directing them to recommended sources and material.

## 8.2   Lectures & Laboratory Sessions

Students are expected to participate in the lecture discussions and to ask questions whenever in doubt about class material. Lectures are performed in a discussion type atmosphere where consistent questioning of concepts takes place and student engagement is crucial. For more information, please refer to the Institute's absence policy found at `catalog.gatech.edu/rules/4/`.

During the laboratory sessions, students are expected to work on and complete exercises presented. Additionally, during some lab sessions, teams will apply newly learned knowledge to the projects they are working on. As selected by the instructor, teams will share their lab work with other teams to inspire each other and cross-fertilize ideas.

## 8.3   Honor Code

Students are expected to abide by the Honor Code of the Georgia Institute of Technology. Honor Code can be found at `osi.gatech.edu/content/honor-code`.

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## 8.4   Students with Special Needs

Your experience in this class is important to us. If you have already established accommodations with the Office of Disability Services, please communicate your approved accommodations to the instructor at your earliest convenience to discuss your needs in this course.

If you have not yet established services through Disability Services, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), please contact the Office of Disability Services at (404)894-2563 or `dsinfo@gatech.edu`.

Disability Services offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and Disability Services. It is important to the Georgia Institute of Technology to create inclusive and accessible learning environments consistent with federal and state law.

## 8.5   Health and Well-Being

Georgia Tech and the School of Aerospace Engineering understand that many students experience stress through a variety of academic, financial, and personal experiences. We value you and want to make you aware of resources available to you should you need them. Your well-being and mental health are important, and we are here for you.

- Center for Assessment, Referral and Education (CARE)

- Campus Police (any emergency): 404-894-2500

- Counseling Center: 404-894-2575

- Dean of Students Office: 404-894-6367

- Georgia Crisis and Access Line: 800-715-4225

- National Suicide Prevention Lifeline: 800-273-TALK (8255)

- Crisis Text Line: Text HOME to 741741

- VOICE: Victims Survivor Support: 404-385-4464 (or 4451)

- Stamps Health Services

# A Class Schedule

| Week | Date | Topic |
|------|------|-------|
| 1 | TBD | Course Introduction, SoSE Recap, & Architecture Review |
| 2 | TBD | Project Review 1 |
| 3 | TBD | System of Systems Modeling Techniques, Challenges, & Stochasticity |
| 4 | TBD | Discrete Design Spaces, Design of Experiments, & Application |
| 4 | TBD | Project Review 2 |
| 5 | TBD | Advanced Surrogate Modeling: Neural Networks & Application |
| 6 | TBD | Advanced Surrogate Modeling: Principal Component Analysis & Kriging |
| 7 | TBD | Project Review 3 |
| 8 | TBD | Visual Analytics & Preliminary Result Plotting |
| 9 | TBD | Dashboard Building & Project Dashboard |
| 10 | TBD | Project Review 4 |
| 11 | TBD | Spring Recess (guess) |
| 12 | TBD | Graph Theory and Markov Chains |
| 13 | TBD | Final Project Review |
| 14 | TBD | Final Presentations |
| 15 | TBD | Feedback Sessions & Final Remarks |

Table 2: Schedule of classes