AE6563 Syllabus

Orbital Mechanics, 3 Graduate Credits

Fall 2026

Instructor Information

Instructor: John Christian

Email: john.a.christian@gatech.edu

General Course Information

Description

First graduate-level astrodynamics class that includes two-body orbital mechanics, orbit determination, orbit prediction, orbital maneuvers, interplanetary trajectories, formation flying, and orbital rendezvous. Coursework will include analytical and numerical (e.g., Matlab) assignments.

Course Learning Outcomes

Upon completion of this course, the student should be able to:

- Explain the basic principles of orbital mechanics and spacecraft performance.
- Analyze and predict orbits for spacecraft in Earth orbit, cislunar, and interplanetary space.
- Evaluate and design orbital maneuvers.
- Apply orbital mechanics principles to space missions.

Required Course Materials

Required texts:

- Bate, Mueller, White, and Saylor, Fundamental of Astrodynamics, 2nd Ed., Dover, 2020.
- Prussing and Conway, Orbital Mechanics, 2nd Ed., Oxford Univ. Press, 2013.

Grading Policy:

This course will be graded on a letter-grade basis.

A 90-100; B: 80-90; C: 70-80; D: 60-70

Assignments

- Homework, 10%
- Exam 1, 30%
- Exam 2, 30%
- Exam 3, 30%

Description of Graded Components

Homework: Consists of six assignments which are due approximately every two weeks throughout the semester. Some homework problems will be drawn from the two required textbooks, and some will be designed by the instructor.

Exams: There will be three exams. These exams will be closed-book, except for one 8.5"x11" page (one-sided) of handwritten notes. These are individual exams and no collaboration is allowed. You are not allowed to discuss with others, access the internet, use AI software tools (e.g., ChatGPT, Claude), or use other software programs (e.g., Matlab) during the exam. Cell phones and other electronic devices must be put away during the exam.

The exams will be designed so access to computer tools is not needed. Exam problems must be worked by hand. Use of a pocket (non-programmable) calculator is allowed to assist with arithmetic.

Course Policies

Attendance and/or Participation

Active participation is essential for understanding major concepts and contributing to the learning of others. Graduate students will be treated as professionals, and each student's attendance will not be tracked or monitored.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Homework assignments are due at the designated time. All homework submissions will be online via Canvas (no email submissions). Unexcused late submission will not be accepted and will receive a grade of zero.

Exams must be taken at the prescribed time and location. Missed exams may not be re-scheduled and will receive a grade of zero.

Except in the case of documented emergencies (as verified by the Dean of Students Office), extensions/rescheduling of homeworks or exams must be requested in writing at

least three business days prior to the due date. Extension will usually be granted for institute-approved activities, personal illness, or career development (e.g., presenting at a conference, job interview).

Collaboration, Group Work, and Use of Generative AI

Discussions with other students about how to solve homework problems are allowed and encouraged; however, all work turned in must be the student's own original work. The use of outside references (e.g. textbooks and online resources) is allowed and encouraged on homework; cite any external referenced material that is used when this occurs.

Use of homework solutions from prior semesters (if/when applicable) is not allowed and is considered cheating. Use of online homework services like Chegg to complete assignments is not allowed and is considered cheating.

AI tools like ChatGPT, Claude, and Gemini are rapidly becoming capable of solving sophisticated engineering problems like those taught in this class. Like any other resource that is available to you (e.g., Matlab), these tools can be used to improve your understanding and to help you catch mistakes. These tools are allowed in this class to assist you with completing your homework and learning. The recommended approach is to solve the problem first by hand without AI assistance and then use the AI tool if you wish to check your solution and to provide additional insight.

If you use an AI tool to obtain your solution to a problem in this class, you are required to give attribution and to include a printout of your prompt and the response you received in your submitted assignment with your name and date on it. Using external sources---including AI tools---without giving proper attribution is a violation of the Georgia Tech Honor Code.

Students are fully responsible for the accuracy of any answers submitted on assignments. If an AI tool provides an incorrect answer which is used by the student as their solution, partial credit will not be awarded on any part of that problem.

Academic violations will be reported to the Office of Student Integrity.

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. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism 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.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated career competencies. This resource developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) 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 the student body. The Student-Faculty Expectations articulate 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.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)