

Guidance & Navigation (Control) of Aerospace Vehicles

EAS 6415 Section 21G1, Course 28644

Class Periods: MWF, period 5, 1:55 PM – 2:45 PM

Location: Online

Academic Term: Spring 2021

Rev. 0

Instructor

John W. Conklin

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Class Lectures on Zoom (live and recorded): MWF, period 5, 1:55 PM – 2:45 PM

Zoom Meeting Link: <https://ufl.zoom.us/j/96676932751?pwd=c0xmemtMNVcvWkxHNTJkZGJYOG94QT09>

Office Hours: Thursdays, period 10, 5:10 PM – 6:00 PM

Zoom Meeting Link: <https://ufl.zoom.us/j/93474060521?pwd=aCszeTIsMFh0ckh0cVJLa0dvVHo2Zz09>

Course Pre-Requisites / Co-Requisites

Understanding of particle dynamics, ordinary differential equations, and matrix algebra. Familiarity with probability and Matlab.

Course Objectives

To develop skills in treating aerospace guidance and navigation systems (spacecraft in particular) as optimal estimation and guidance problems; To learn to apply a statistical approach to guidance and navigation, and to model and numerically simulate the dynamics of aerospace systems, accounting for the capabilities of modern technologies.

Materials and Supply Fees

None.

Required Textbooks and Software

- Course notes
- Satellite Orbits: Models, Methods and Applications, O. Montenbruck & E. Gill, Springer, 1st Ed.

Recommended Materials

- Numerical Computing with Matlab, C. B. Moler, SIAM
- Fundamentals of Astrodynamics, R. R. Bate, D. D. Mueller, J. E. White, Dover Books
- Tactical & Strategic Missile Guidance, Paul Zarchan, AIAA, 5th Ed.

Course Schedule

Week 1: Lecture 1. Introduction
Week 2-3: Lecture 2. Astrodynamics review: The two-body problem
Week 4-5: Lecture 3. Forces that perturb satellite orbits
Week 6: Lecture 4. Numerical methods for ordinary differential equations
Week 7: Lecture 5. Models for navigation systems
Week 8-10: Lecture 6. Optimal estimation review
Week 11: Lecture 7. Orbit determination and navigation
Week 12-13: Lecture 8. Guidance
Week 14-15: Lecture 9. Selected problems in satellite guidance and navigation

Attendance Policy, Class Expectations, and Make-Up Policy

All lectures for this course will be held live online via Zoom (links are above). Each lecture will be recorded and uploaded to Canvas for students to view at a later time. Attending all lectures is vital to your success in the course.

Evaluation of Grades

Assignment	Percentage of Final Grade
Take-home Assignments (7)	50%
Course Project	50%
TOTAL	100%

Grading Policy

Percent	Grade	Grade Points
92.0 - 100	A	4.00
89.0 - 91.9	A-	3.67
86.0 - 88.9	B+	3.33
82.0 - 85.9	B	3.00
79.0 - 81.9	B-	2.67
76.0 - 78.9	C+	2.33
72.0 - 75.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
62.0 - 65.9	D	1.00
59.0 - 61.9	D-	0.67
0 - 58.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

***Engineering Mechanics - Dynamics, EGM 3401
John W. Conklin, Fall 2020***

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.