EAS 4510 – ASTRODYNAMICS Spring 2022

Objective: To develop proficiency with the concepts of (i) orbital motion for both natural and artificial bodies and (ii) the attitude motion of artificial bodies.

Required Text: Bate, R. R, Mueller, D. D., & White, J. E., Fundamentals of Astrodynamics, Dover. (ISBN 0-486-60061-0)

Supplemental Texts:
1. Curtis, H., Orbital Mechanics for Engineering Students, Elsevier. (ISBN 0123747783)
2. Prussing, J. E. and Conway, B. A., Orbital Mechanics, Oxford University Press. (ISBN 0-19-507834-9)
3. Vallado, D., Fundamentals of Astrodynamics and Applications 3rd Ed., Microcosm, Inc. (ISBN: 978-1-881883-14-2)
4. Bond, V. & Allman, M., Modern Astrodynamics: Fundamentals & Perturbations, Princeton. (ISBN 0691044597)
5. Kaplan, M. H., Modern Spacecraft Dynamics and Control, John Wiley and Sons.
6. Chobotov, V. A., editor, Orbital Mechanics, 2nd Edition, AIAA Educational Series.

Prerequisite: EGM 3401 (with minimum grade of C) and EGM 4313 or MAP 4305 or MAP 5304)

Instructor: Dr. N. Fitz-Coy (206 MAE-A) (phone: 392.1029; email: nfc@ufl.edu)
Office hours: Open door policy in effect; official: TBD

Teaching Assistants:
- Alexander Benvenuti (abenvenuti@ufl.edu): TBD
- Jared Chown (jaredchown@ufl.edu): TBD

Lectures: MWF 4th (10:40 – 11:30) MAE-A 303

Final Exam: 3E (3:00 - 5:00 PM April 28, 2022) or April 27, 2022 at 12:30 PM - 2:30 PM

Grading: Grades will be based on the following breakdown:

Homework/Quizzes	**30%**
2 Exams (25% each)	**50%**
Final (Comprehensive)	**20%**

Scale: **A** = 95-100; **A-** = 87-94.9; **B+** = 83.5-86.9; **B** = 80-83.49; **B-** = 77-79.9; **C+** = 73.5-76.9; **C** = 70-73.49; **C-** = 67-69.9; **D+** = 63.5-66.9; **D** = 60-63.49
More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Class Attendance and Student Behavior: Class attendance is not mandatory but students are strongly encouraged to attend all lectures. When in class, however, **ALL** personal communication devices (cell phones, iPads, etc.) shall be turned off (or in the silent mode); each disturbance will result in 5 points being deducted from your overall score.

Assignments: Homework problems will be assigned from the textbook and from handouts. **Quizzes will be administered without warning at the discretion of the instructor. Exams will be scheduled with at least one week notice.**

Submission of Assignments:
- For maximum credit work as neatly as possible and show all relevant work.
- Unless stated otherwise, HW solution sets are due by the close of business (COB) on the **Friday** following assignment. They are to be submitted via Canvas.
- Late HW will NOT be accepted.
- On ALL examination solutions, use only **ONE SIDE** of your answer sheets (i.e., do **NOT** write on the back). Items written on the back **SHALL NOT** be graded.

Course Evaluation:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/

In-Class Recording:

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code

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Accommodations for Disabilities:

Students with disabilities who are requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodations.

The Disability Resource Center can be reached at 352-392-8565 or at http://www.dso.ufl.edu/drc/

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 Conduct Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. 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:

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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@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

CONCEPTS	TEXT Bate, Mueller, White	STATUS
Introduction and Vector Review	—	
Coordinate Systems & Transformations	§2.2, 2.6	
2-Body/n-Body Problem	Chap. 1	
Orbit Determination	Chaps. 2 & 5	
Time Dependence of ***r*** and ***v***	Chap. 4	
Orbit Maneuvers	Chap. 3	
Interplanetary Trajectories	Chap. 8	
3-Body Problem	—	
Linearization and Perturbation Methods	Chap. 9	
Spacecraft Attitude Representations	—	
Time Measurements and Units	§2.9, 1.11	