ENG ME406 Dynamics of Space Vehicles Fall 2021
Course Credits: 4.0
Professor Brian Walsh
Office 110 Cummington Mall, Room 303
bwalsh@bu.edu
617-353-3414

Lecture: ENG 202, 1:30pm-3:15pm (all times eastern)

Office Hours: Monday 10am-12pm or by appointment

Text: Howard D. Curtis, Orbital Mechanics for Engineering Students, Third Edition, Elsevier, 2014.

Description: The Dynamics of Space Vehicles will cover the space environment and motion of space vehicles within it. The dynamics and composition of the neutral and plasma material in the space environment ranging from low-Earth orbit to distant heliospheric spacecraft trajectories will be covered. A physical understanding of orbital motion and precession at the Earth as well as orbital maneuvers will be covered. These maneuvers will cover Earth-centric transfers as well as interplanetary motion through theory and simulation. Rocket dynamics and multiple stage propulsion systems will also be covered as a means to propel space vehicles.

Website: The course website is on BlackBoard (learn.bu.edu). Electronic materials will be posted periodically throughout the semester, so check the website often for updates. Note that while grade assignments will be posted for your review, we do NOT use the Blackboard Grade Center to calculate semester grades. Ignore any interpretation of your grade based on whatever Blackboard-reported “points” that are displayed.

Required	**Grade Fraction**
Homework	20%
Midterm Exam 1	22.5%
Midterm Exam 2	22.5%
Final Exam	25%
Class Participation	10%

Homework: Unless otherwise stated, homework will be due at the beginning of class on the prescribed due date. Since solutions to the problem sets will be posted following the lecture, **late problem sets are not permitted** and will receive a zero. Collaboration with others in the class is encouraged on homework, but each student must hand in their own work.

Homework will also be subject to the following strictly enforced conditions:

- No digital material may be transferred between students when collaborating.
- You must be able to fully explain your answers upon demand (and I will demand it!).
- You may not use any human resource outside of class (including web-based help services, outside tutors, etc.) in doing your homework. Obviously, you may not collaborate with anyone on exams.

Failure to meet any of the above conditions could constitute plagiarism and will be considered cheating in this class. If you are not sure whether something is permitted by the course policy, ASK ME! (it's much more awkward to explain your actions after the fact to the college disciplinary committee).

Homework assignments are to only be handed in digitally through *GradeScope* (course code: WY6EZP). Paper copies will not be accepted.

Exams:
Exam 1 is scheduled for September 30 in class. Exam 2 is scheduled for November 4 in class. Both exams will be in-class and closed book. Communication with others or outside resources during the exam is prohibited.

Make-up exams will be given only in extreme circumstances. It is your responsibility to let your instructor know as far in advance as possible of an unavoidable conflict or medical emergency.

Grades: All course grades will be posted to Blackboard. The final grade will be based on the grades from blackboard applied to the weighting above.

COVID 19 & BU Community Health Expectations: Masks are required and face coverings must be worn over the mouth and nose at all times when in public spaces on campus, including classrooms. Students should be prepared to show proof that they are compliant with health attestations and testing in order to attend class. All students are expected to follow all university guidelines with respect to daily symptom checks, testing, social distancing, and mask wearing when they leave their dorm or home. For a detailed description of official BU policies regarding COVID, please visit:
http://www.bu.edu/dos/policies/lifebook/covid-19-policies-for-students/

Accommodations for students with documented disabilities: If you are a student with a disability or believe you might have a disability that requires accommodations, please contact the Office for Disability Services (ODS) at (617) 353-3658 to coordinate any reasonable accommodation requests. ODS is located at 19 Deerfield St, on the second floor. I will make every effort to accommodate such requests but (a) please notify me at the beginning of the semester if you've received approved accommodations in previous semesters (even if you haven't received your paperwork for this semester yet!) and (b) my

policy is that I need at least one week's notification prior to each exam so we can make the necessary arrangements. For more information: http://www.bu.edu/disability/accommodations/

Ethical Responsibilities
Cheating on homework, quizzes, exams, project reports, or any form of assignment, may be a form of plagiarism and is an infringement of every code of engineering ethics. Plagiarism is a serious academic offense and should not be taken lightly. Understanding your ethical responsibilities is an integral part of becoming a professional. A copy of the Code of Ethics of engineers, promulgated by the Accreditation Board for Engineering and Technology (ABET) and the National Society of Professional Engineers, can be found on the main course web site.

Please recall that when you enrolled at Boston University, you agreed to an Academic Honesty Pledge. The Academic Conduct Code details your responsibilities as well as the results of code violations, and is posted at: *https://www.bu.edu/academics/policies/academic-conduct-code/*

Class Schedule:

	Week Beginning	**Topic**
1	8/30	Two body dynamics
2	9/6	Two body dynamics
3	9/13	Elliptical orbits
4	9/20	Hyperbolic trajectories
5	9/27	3 body problem, **Exam 1**
6	10/4	3D Orbits at Earth
7	10/11	Orbital precession (*Indigenous People's Day miss Tue lecture*)
8	10/18	Orbital phasing
9	10/25	Interplanetary trajectories I
10	11/1	Interplanetary trajectories II
11	11/8	Exam review, **Exam 2**
12	11/15	GMAT and Rockets
13	11/22	Rockets +Staging (*Thanksgiving week*)
14	11/29	Space Environment
15	12/6	Deorbit + Exam Review