

ENG ME406 Dynamics of Space Vehicles
Course Credits: 4.0
Professor Brian Walsh
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Fall 2020

Lecture: EPC 206, 1:30pm-3:15pm (all times eastern)

Zoom Lecture Address:

Join Zoom Meeting

<https://bostonu.zoom.us/j/92190160505?pwd=UFBmTmRlcVNCUnBMRnVyN0N5R3dJdz09>

Meeting ID: 921 9016 0505

Passcode: 828165

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

<https://bostonu.zoom.us/j/95458964228?pwd=M3VPYXpRWHRlReS9YTEQwaEdBTVY1QT09>

Meeting ID: 954 5896 4228

Passcode: 358237

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

Homework
Midterm Exam 1
Midterm Exam 2
Final Exam

Grade Fraction

20%
22.5%
22.5%
25%

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. Group collaboration is encouraged on homework, but each student must hand in his or her own work. No digital material may be transferred between students when collaborating.

Homework assignments are to only be handed in digitally through *GradeScope* (course code: 9RG76P). Paper copies will not be accepted.

Exams:

Exam 1 is scheduled for October 1 in class. Exam 2 is scheduled for November 5 in class. Both exams will be open book however communication with others 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.

Exams will only be handed in digitally through *GradeScope*. Paper solutions will not be accepted.

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	9/2	Two body dynamics
2	9/7	Two body dynamics
3	9/14	Elliptical orbits
4	9/21	Hyperbolic trajectories
5	9/28	3 body problem, Exam 1
6	10/5	3D Orbits at Earth
7	10/12	Orbital precession (<i>Columbus Day miss Tue lecture</i>)
8	10/19	Orbital phasing
9	10/26	Interplanetary trajectories I
10	11/2	Interplanetary trajectories II (<i>Election Day</i>)
11	11/9	Exam review, Exam 2
12	11/16	GMAT and Rockets
13	11/23	Rockets +Staging (<i>Thanksgiving week</i>)
14	11/30	Space Environment
15	12/7	Deorbit + Exam Review