ENG EK131, M3, Introduction to Rocket Science Spring 2021

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Lecture: Mondays, 10:10am-11:55am, ENG 302
Zoom Lecture Address:
https://bostonu.zoom.us/j/95809536374?pwd=U01ZRVgxWkcwRldlQUVyM2dxTlR6QT09
Meeting ID: 958 0953 6374
Passcode: 064912

Zoom Office Hours: Thursday 12:15pm-2:15pm or by appointment.
https://bostonu.zoom.us/j/96899209627?pwd=UU93RWZQQnJmWFZHbExvUklnSnFFZz09
Meeting ID: 968 9920 9627
Passcode: 153638

Description: As society becomes increasingly reliant on space-born assets, reliable rockets to deliver those assets safely to space are becoming more and more critical. Introduction to Rocket Science is a hands-on introduction to rocket dynamics and propulsion. The course will cover modeling tools to simulate the dynamics of rockets as well as different propulsion methods such as chemical, compressed gas, as well as electromagnetic propulsion. Areas of focus will include, mechanics, fluids, orbital dynamics, electronics, and manufacturing.

Website: The course website is on *BlackBoard* (learn.bu.edu). Lectures, class notes, and other material will be posted throughout the semester. **Note** that while grades for 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**
Project Reports and HW	50%
In Class Participation	25%
Final Presentation + Report	25%

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.

Due Dates: All project reports and HW are due at the beginning of the designated lecture to *GradeScope (*https://www.gradescope.com/*)*. Reports handed in after the beginning of the class time or through a medium other than *GradeScope* will not be accepted and will receive a grade of zero.

Homework assignments are to only be handed in digitally through *GradeScope* (course code: KYZ8N4). Paper copies will not be accepted.

Projects Reports: Project reports are designed to describe the experiment conducted. It should 1) briefly summarize the background of the experiment, 2) describe the experimental procedure conducted, and 3) present the results. If plots are included, they must follow "Brian's Rules of Data Visualization" posted on blackboard. The length of a project report should be between 1.75 and 2.25 pages.

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

Equipment: Each student, in-person or remote, will receive a kit for this course. The kit will include:

1. Baby Bertha Model Rocket Kit
2. Kitchen scale
3. Elmers wood glue

Also needed for this course is a set of calipers. The calipers are provided in the EK131 Course Kit that all ME freshman receive from the ME department. If you do not receive a kit by the end of the week, or if your kit is missing components, please let me know. Do not assemble your rocket until the appropriate class period. For remote students, assembled rockets will need to be mailed to campus for launch.

Software: Students will be required to use OpenRocket during the semester. The free software can be downloaded (http://openrocket.info/) and run easily on a laptop. Students will also be required to use MatLab. This can be downloaded through BU or used through BU's citrix tool (http://www.bu.edu/engit/knowledge-base/citrix/citrix-how-to/).

Launch Day: The rockets will be launched from Nickerson Field on Sunday, April 11 from 1-3pm. An extra required lecture will be held on this day.

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.

Ethical Responsibilities

Cheating on quizzes or 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/*

Schedule

Lec	Date	Topic	HW
1	25 Jan	Mechanics I: Ballistic trajectories. Rocket equation	
2	1 Feb	Mechanics II: Rocket dynamics, Matlab practice, plotting rules	
3	8 Feb	Engines I: Solid motors	
4	*16 Feb*	*Project 1 – Chemical thrust*	HW1
5	22 Feb	Engines II: Liquid propulsion, electric propulsion	Chemical thrust report
6	1 Mar	Attitude dynamics I	
7	*8 Mar*	*Project 2 – Fin design*	
8	15 Mar	Attitude dynamics II	Fin design and manufacturing report
9	22 Mar	Rocket structures	
10	*29 Mar*	*Rocket assembly. Air tunnel + stability testing*	
11	5 Apr	Launch simulation	HW2 – Go/No Go
12	*12 Apr*	*Project 3 - Lecture moved to weekend for launch – Apr 11*	
13	21 Apr	Orbital Dynamics	
14	26 Apr	Final Presentations	Launch results report