EGG 403: Introduction to Rocket Science/CubeSAT III (1 credit)

Fall 2021
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Office Hours: Tentatively Friday, 3:00pm – 4:00pm (BPB Room 248-249) or by appointment.
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Lecture: Mon. and Wed. 3:20pm – 3:45pm
Location: SEB 1240

Content: This course aims to guide students toward completing a project which will be integrated into the RebelSAT/CubeSAT effort. The goal is to begin and complete work on a previously-agreed-upon project that will integrate with and aid the RebelSAT/CubeSAT effort.

Prerequisites: Physics 180 and either Physics 181 or 182; and Math 182.

Learning Outcomes: It is expected that you will:
1. Understand the basics of rocket science (propulsion, gravity, vacuum physics, radiation, thermal energy, radiation, radiation damage, mechanical constraints and design).
2. Understand the requirements for CubeSAT and how they relate to your chosen project.
3. Communicate the fundamental scientific principles and their application (engineering) to your final project.
4. Complete a project that integrates with/relates to the RebelSAT effort.
5. Learn practical skills such as machining, soldering, computer simulations, optics, electrical measurement, building an electrical circuit, and computer aided design depending on their project.
6. The student will specialize in one or more of the following areas for their project: a. electronics, b. mechanical properties and design, c. vacuum, d. thermal physics/thermodynamics, e. radiation damage, f. communications/telemetry, g. laser physics/optics/interferometry, h. power sources and power management by mutual agreement with the instructor.

Grading:
20% Participation (based on weekly meetings with instructor and class attendance)
40% Oral talk (30 minutes) detailing the project and its completion. This includes public demonstration of the project.
40% Final 4-5 page progress or final report of project

Grading Scale:
90 → 100: A- → A+; 80 → 89: B- → B+; 70 → 79: C- → C+; 60 → 69: D- → D+; Below 60: F

Attendance: You are expected to attend all lecture and laboratory periods. You are responsible for all assignments and announcements given in class. Missed exams will result in a grade of zero. In the event of an extreme emergency (e.g. hospitalization), make-up exams may be given only with the written permission of the Chair of the Physics Department or the Dean of Sciences. You may be asked to provide written documentation to justify your request to make up material. For example, often an excuse such as “I had a death in the family” is given for an absence. If such is the case, then proof of death and proof of close family relation must be supplied in order for the work to be made up. If you represent UNLV at any official extracurricular activity, you shall have the opportunity to make up assignments, but you must provide official written notification to the instructor no less than one week prior to the missed class. A student missing a class or laboratory assignment because of observance of a religious holiday shall have the opportunity to make up missed work. The student must notify the instructor of anticipated absences by the last day of late registration. Students who represent UNLV at any official extracurricular activity shall have the opportunity to make up lost work but must provide written notification to the instructor no less than one week prior to the missed class(es).
**Homework:** Homework will be assigned weekly and due one week later. Physics cannot be mastered without working out physics problems. Don't be discouraged when the material initially seems unfamiliar or the homework is difficult. You are not expected to understand the material immediately. Your mastery of physics will be a gradual process that will develop through diligent practice (i.e., homework). Hopefully, you will learn that this is not an unpleasant but intellectually engaging experience. Although each homework assignment is numerically worth the least in terms of your overall grade, it is the most important part of your studies. Although we will discuss homework problems occasionally in lecture, questions on homework can always be raised with your instructor during his office hours.

**Exams:** The Final Exam will encompass ALL of the material covered in the class.

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**Final Note:** Though physics has a reputation of being a difficult subject, you will find that the knowledge and problem solving skills that you learn here will be extremely valuable no matter what career path you follow. Therefore, don't be intimidated, try hard, and never be afraid to ask questions. This syllabus may change as the course progresses. The instructor will provide advance notice if and when this happens.
Tentative Schedule:

Week 1 (8/23, 8/25) Introduction to CubeSAT Reading assignment: CubeSAT document from NASA.

Week 2 (8/30, 9/1) Students work on chosen projects.

Week 3 (9/8) Students work on chosen projects.

Week 4 (9/13, 9/15) Students work on chosen projects.

Week 5 (9/20, 9/22) Students work on chosen projects.

Week 6 (9/27, 9/29) Invited lecture on topic related to CubeSAT

Week 7 (10/4, 10/6) Invited lecture on topic related to CubeSAT

Week 8 (10/11, 10/13) Invited lecture on topic related to CubeSAT

Week 9 (10/18, 10/20) Students meet individually with Instructor to discuss project progress.

Week 10 (10/25, 10/27) Students meet individually with Instructor to discuss project progress.

Week 11 (11/1, 11/3) Students meet individually with Instructor to discuss project progress.

Week 12 (11/8, 11/10) Student Oral Presentations on final project.

Week 13 (11/15, 11/17) Student Oral Presentations on final project.

Week 14 (11/22, 11/24) Student Oral Presentations on final project.

Week 15 (11/29, 12/1) Student Oral Presentations on final project.