ME 4090 – Introduction to High-Power Rocketry and Stratospheric Ballooning  
Summer 2017, 4 credits  
syllabus version 1: 6/13/2017

Lecture: 1:00 to 4:00 p.m. Tuesdays and Thursdays in Akerman 227  
Lab/Build Room: “Old Mechanical Engineering” Room 80 (in the basement)

Reserve July 8 (a Saturday) to attend an all-day high-power rocket launch. Weather-delay dates (Tripoli MN makes the call): Sunday, July 9, or Saturday, July 15, or Sunday, July 16. Also we will conduct an all-day stratospheric balloon flight on either Tuesday, July 25, or Thursday, July 27. The professor for your other day class know that you will be gone on one of those two dates. Transportation to both launches will be provided.

Professor: James Flaten, Ph.D.  
Contract Associate Professor in the Aerospace Engineering and Mechanics (AEM) Department – U of MN – Twin Cities  
Office: Akerman 205C (in the Akerman/Shepherd skyway)  
flate001@umn.edu  
office – 612-626-9295, cell – 651-399-2423  
Office/Lab Hours: 1 p.m. to 2 p.m. on Mondays, Wednesday, and Fridays if requested, or by appointment  
Teaching assistants: Ryan Bowers, bower290@umn.edu, cell – 612-619-8024  
Josh Nelson, nels8193@umn.edu, cell – 651-263-6218  
Texts: Modern High-Power Rocketry 2, Mark Canepa  
Course Web Site: http://www.me.umn.edu/courses/me4090_summer2017/

Brief course description: This hands-on course will first take students beyond (Estes-type) “model rocketry” into the realm of “high-power rocketry,” building rockets with H-size (or larger) motors, some capable of reaching altitudes of several thousand feet. Attending a day-long launch event with a local high-power rocketry club will be a required class activity for a weekend date in early July. Then the class will design, build, and use weather balloons to launch low-cost “spacecraft” into “near-space” (AKA the stratosphere), which has many of the same physical properties (and view!) as low-earth orbit. The balloon flight is tentatively scheduled for a week day in late July.

Brief biography of the instructor: Dr. James Flaten is a contract faculty member in the Aerospace Engineering and Mechanics Department. Dr. Flaten’s academic background is in experimental low-temperature physics but he enjoys using high-power rocketry and stratospheric ballooning (AKA weather ballooning) as relatively lost-cost means of giving students hands-on experience building and flying space-related hardware. In addition to this class he is working with a team of undergraduate students to prepare stratospheric payloads to live-stream video from the path of totality of a solar eclipse on August 21, 2017.

Course Objectives: In this class the student will –

- Practice their design/build skills, practice working in teams, and practice using English.  
- Learn about model rockets, high-power rockets, and stratospheric spacecraft.  
- Work with a team to build and fly two vehicles, one high-power rocket and one stratospheric spacecraft (AKA balloon payload).  
- Present the design of and the flight results from both vehicles orally in class, in short video reports, and at a public exhibit at the end of the summer.
Scholastic Conduct:
You will be respected and treated as an honest, honorable person and are expected to treat all your instructor(s) and classmates in a similar manner. Attendance and active participation in class activities is expected, but disrespectful behavior towards anyone or actions that disrupt the supportive learning environment will not be tolerated.

As a student of the University of Minnesota, you are expected to be familiar with the Student Code of Conduct:
and the broad definition of Scholastic Misconduct as found here:
http://www.sos.umn.edu/Staff-Fac/Syllabus.html

In particular, cheating on any assignment, quiz, or exam may result in penalties ranging from receiving a zero on that particular assignment to receiving an “F” for the course and/or being suspended from the University.

In general you will be permitted (indeed, encouraged!!!) to work with your classmates on assignments, in addition to working as a team on your rocket and balloon payload. When individual work is required, it will be clearly described as such. Any attempt to communicate with another person or to view someone else’s work or to assist another student improperly during a quiz or an exam constitutes cheating and will be dealt with according to University policy.

University of Minnesota Course Policies:
The following general AEM policies also apply to this course:
http://www.aem.umn.edu/teaching/syllabi.shtml

Disability Resource Center
The University of Minnesota is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact the DRC at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.
- If you are registered with the DRC and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course.

Additional information is available on the DRC website: https://diversity.umn.edu/disability/

Student Mental Health Statement
As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via http://www.mentalhealth.umn.edu

Graded aspects of the class:
In this class 50% of your grade will be based on your individual effort (40% for written assignments, both in-class activities and take-home homework, and 10% for individual participation in your team (as assessed by instructor and TA observations, plus peer review)) and 50% of your grade will be based on the quality of your team’s work: 30% total for of your two
rocket projects (team assignments, rockets designed, built (quality, on-time), tested, flown) plus 20% total for your team presentations and written documentation about “Round 1” and “Round 2” rockets – this puts more weight on Round 2 because that has both oral and written team reports). (Caveat – you only get team points if you are actively participating on your team.)

Point values for specific assignments will be announced as we go, but at the end of the term all the points in each category will be weighted according to the percentages listed above.

Exams:
There will be regular “comprehension” questions and might be some open-notes quizzes in class but there will not be any general midterm exams nor a final exam. There will be several in-class (team) oral reports and two video reports.

Class absence/make-up work policy:
Make-up work will not be allowed for unexcused absences. In the case of excused absences, in-class activities that cannot effectively be made up will simply not count towards your grade. Make-up opportunities for homework assignments and quizzes will only be offered if:

- You have a valid reason for a class absence according to University policy (e.g. health issue, family emergency, sanctioned University event, religious observance) and you provide valid documentation of your excused absence (such as a note from a doctor) when you next see the professor (see below – usually before the following class period).
- You contact the professor by phone or e-mail as soon as you know about the absence (typically before the class you miss (quite possibly at the very start of the semester!), unless it is a genuine emergency) to explain your situation and to make an appointment to see the professor (definitely before the next week’s class) to discuss what you missed.

Late assignment submission policy:
All assignments will be given specific due dates and times and deductions will be made if they are submitted late. These penalties are stiff, so don’t lose points by turning things in late!

- -10% of total point value for assignments received (hard copy or electronically) on the due date but later than the due time (e.g. after class, if due at the beginning of class; after 5 if due at 5 p.m., etc.)
- -20% of total point value for assignments received on the following business day (e.g. things turned in on Wednesday if due Tuesday; things turned in over the weekend or on Monday if due Friday, etc.)
- -50% of graded (not total) point value for assignments received later than the following business day but still within 1 week of the original due date
- No credit for assignments more than 1 week late

Checking Scores Online:
You can check your scores for the class in the AEM Student Record System at www.aem.umn.edu/srs
It is a good idea to check regularly to make sure that each of your scores has been correctly entered in the system – errors in data entry do occur! Questions or comments about grading must be raised within one week of scores being posted and/or assignments being returned, after which grades will be considered final.

Letter grades will be assigned according to the following numeric ranges:

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<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>93.00 – 100 %</td>
<td>A</td>
</tr>
<tr>
<td>90.00 – 92.99 %</td>
<td>A-</td>
</tr>
<tr>
<td>87.00 – 89.99 %</td>
<td>B+</td>
</tr>
<tr>
<td>83.00 – 86.99 %</td>
<td>B</td>
</tr>
<tr>
<td>80.00 – 82.99 %</td>
<td>B-</td>
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<tr>
<td>77.00 – 79.99 %</td>
<td>C+</td>
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<tr>
<td>73.00 – 76.99 %</td>
<td>C</td>
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<tr>
<td>70.00 – 72.99 %</td>
<td>C-</td>
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<tr>
<td>67.00 – 69.99 %</td>
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<td>60.00 – 66.99 %</td>
<td>D</td>
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<tr>
<td>00.00 – 59.99 %</td>
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These ranges should be considered tentative. I reserve the right to lower (but will not raise) one or more of these cut-offs at the end of the class. Note – I very rarely exercise this right, so assume that these letter grade cut-offs will persist.

*Feedback about this class, delivered in person or sent by e-mail, is always welcome. Anonymous feedback, though accepted, is significantly less useful than signed feedback.*

< *The contents of this syllabus are subject to modification if the need arises.*>