

AEM 1301 (Freshman Seminar)**Fall 2021****Introduction to Spaceflight (with Stratospheric Ballooning build/fly project)**

2 credits; prerequisite – incoming freshman (to any college)

Syllabus version 2: 9/14/2021

Lecture: 3:35 to 5:30 p.m. on Tuesdays in Akerman 317Aside: If we ever need to use Zoom, here is the link in advance: <https://umn.zoom.us/j/9772902391>**Build Space:** Either Shepherd 394 or else the “Balas Atrium” in Akerman Hall (but always meet first in Akerman 317, unless told otherwise)

Reserve Saturday, October 30, for a “near-space” weather-ballooning class flight (a day-long field trip – transportation provided). This is a required class activity. Back-up (weather-delay) dates: Sunday, Oct. 31, or else the first weekend of November.

Professor: James Flaten, Ph.D.
Assoc. Dir. of NASA’s MN Space Grant Consortium (MnSGC)
and 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 hours: 11:45 a.m. – 12:45 p.m. Tuesdays
12:45 p.m. – 1:45 p.m. Fridays (let me know in advance if you want to
meet/talk then) or by appointment (note that I am generally not available
immediately before nor immediately after class on Tuesdays)

Teaching assistant: Seyon Wallo, wallo016@umn.edu, 651-404-0735 (cell)

TA consultation hours: noon to 2 p.m. Thursdays (but always let Seyon know in advance, if you
want to meet/talk then) or by appointment

Textbook: none (but occasional readings, such as “Near Space” articles by Paul
Verhage, will be posted on the class Canvas site)

Course Web Site: <https://canvas.umn.edu/courses/267585>

Brief course description:

Outer space, sometimes called the “Final Frontier” has always been difficult to reach due to the tremendous expense of rocket launches and the limited number of launch opportunities. In this hands-on course we will hone “amateur-spacecraft”-building skills including rugged, light-weight structural construction, microcontroller programming, soldering, wiring, and CAD. Then we will design and build miniature spacecraft and use relatively-inexpensive helium-filled weather balloons to carry them into the stratosphere (AKA “near-space”), which has many of the same physical properties (and view!) as outer space.

The balloon launch and recovery will be a required day-long class activity on a weekend date in late October or early November. (This activity is weather dependent, so the flight date will need to be flexible. A “primary” date (and 3 back-up dates) are listed above.) Note: Class field trips are currently allowed (as of the start of the semester), but an alternate activity (monitoring the flight in real time – so on the same date as the field trip) will be available to anyone who elects not to make the trip. If class field trips are no longer allowed as of late October, class members will still design, build, and ground test experiment-carrying payloads which will then be launched on a weather balloon mission by a small team of advanced undergraduate students and all class members will remotely monitor some aspects of the flight (in real time). After the balloon flight, the remainder of the semester will involve data analysis plus discussions

and activities relating to full-fledged (i.e. outer space) spaceflight including scientific accomplishments and engineering challenges of past, current, and future space missions.

If University policy evolves between now and late October to limit (or even preclude) team-building of ballooning payloads and/or conducting weather balloon flights, the class design/build/fly project may need to be adjusted. If this becomes necessary, details will be announced as we go.

Brief biography of the instructor:

Dr. James Flaten is the Associate Director of NASA's Minnesota Space Grant Consortium, a higher education program whose goals include promoting interest in space science and space exploration. Though housed in the Aerospace Engineering and Mechanics (AEM) department, Dr. Flaten's academic background is actually in experimental physics and he has also taught many physics, astronomy, and basic engineering classes in the past. He enjoys using ballooning (stratospheric free-ballooning and lighter-than-air RC airships), high-power rocketry, quadcopters, and robotics as relatively low-cost means of giving students hands-on experience building and operating NASA/aerospace-related hardware. His (extracurricular) stratospheric ballooning team captured video from the stratosphere of the Moon's shadow during a total solar eclipse in August 2017 and hopes to do so again during solar eclipses on October 14, 2023, and April 8, 2024.

Course Objectives: In this class the student will –

- Have fun learning, make friends among other incoming freshmen, share tips about succeeding in college and practice putting them into practice.
- Learn about outer space, and “near-space,” plus spacecraft and flight in both regions, through class discussions plus locating-then-reading scientific literature. (U of MN Student Learning Outcomes – “Can locate and critically evaluate information” and “Have mastered a body of knowledge (at an introductory level) and a mode of inquiry”)
- Work as a team to build a miniature (near-) spacecraft to perform science experiments and fly it on a high-altitude balloon mission to near-space. (U of MN Student Learning Outcome – “Can identify, define, and solve problems”)
- Present the design of and results from their near-spacecraft, both orally and in writing. (U of MN Student Learning Outcome – “Can communicate effectively”)
- Reflect upon the multitude of disciplines, including but not limited to science and engineering, involved in space programs and spaceflight. (U of MN Student Learning Outcome – “Understand the role creativity, innovation, discovery, and expression across disciplines”)
- Share what they have learned to a general public audience through an end-of-semester public exhibit (or video, if public exhibits are not allowed as of the end of the semester). (U of MN Student Learning Outcome – “Can communicate effectively”)

Latex notice:

High-altitude ballooning involves the use of latex weather balloons. Direct contact with latex is minimal, but students with known latex allergies (or those concerned about possible exposure) should contact their health care provider about potential risks. Concerned students can arrange with the instructor for launch day assignments that do not involve any direct contact with latex balloons. For example, remote monitoring of weather balloon flights will not involve any latex exposure.

Laptop notice:

Bring a laptop to every class meeting, if possible – preferably one that has USB port(s) and an SD card reader. (Most programming uses a USB cable and many devices log data to micro-SD cards, which can be downloaded using an SD card slot.) You will also need a laptop in class for some Canvas activities and for doing CAD exercises. If you don't have easy access to a laptop to bring to class, talk to Prof. Flaten (in advance!) about borrowing one from him for use just during class sessions.

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: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf and the definition of Scholastic Misconduct found here: https://sos.dl.umn.edu/syllabus_supplement. 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 this class you will often be permitted (indeed, encouraged!!!) to work with your classmates on assignments, in addition to working as a team on your ballooning 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:

Policies in this document also apply to the course: <https://dept.aem.umn.edu/teaching/syllabi.shtml> and <https://policy.umn.edu/education/syllabusrequirements-appa>. These mention the fact that **instructors retain the copyright to all their course materials** (see [Respecting intellectual property](#)). While students hold the copyright to their own notes from a course, students may not engage in the widespread distribution or sale of transcript-like notes or notes that are close to verbatim records of a lecture or class presentation. However, students may share such notes with other students in the same class.

Note: students may not record class sessions (such as Zoom sessions) without express instructor consent. Instructors, on the other hand, may record class sessions (and potentially post the recordings) without express student consent.

University of Minnesota COVID-19 Policies:

<https://safe-campus.umn.edu/return-campus/stop-spread-covid-19>

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 from them requesting reasonable accommodations, contact your instructor(s) as early as possible in the semester to review what accommodation(s) might be offered in their course(s).

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>.

DUO Security Log-in Statement

If you use Duo Security to sign in to applications, YOU ARE STRONGLY ENCOURAGED to set up back-up devices in Duo Security so that you are prepared in the event that your primary Duo device is unavailable (you forgot it, it was stolen, it's broken, the battery is dead, etc.). Learn about back-up devices at <https://it.umn.edu/services-technologies/how-tos/duo-add-or-remove-devices>.

As a Duo user, it is your responsibility to come prepared to sign in to applications necessary for class activities, including exams and quizzes. If you are unable to sign in, you may lose points for the class activity. Failure to bring your Duo device or a back-up device is not considered an excused absence nor a valid reason for requesting to make up work.

Learn more about Duo Security at z.umn.edu/duosecurity.

Submission/communication policies:

- Always use your assigned @umn.edu e-mail address for class e-mail correspondence.
- To attract my attention in e-mail messages, put "AEM 1301" and your name in the Subject line for every e-mail message you send me, followed by the actual subject.
- When asked to submit items "by e-mail attachment," send an actual file, NOT a link to a posted document. **If you can still reach (and edit) a document, it doesn't count as being submitted.**
- Put your name and the date and the class designator ("AEM 1301") on a single line at the top of every document you submit on paper. Items you submit through Canvas are automatically tied to you and date/time-stamped, so including this information is optional (unless explicitly requested), but is still a good idea to include them.
- If you are submitting anything on behalf of a team, include the full names of all team members somewhere obvious, like at the top of the first page (or in the Subject line, for e-mail).

Graded aspects of the class:

In this class, 50% of your grade will be based on individual effort (40% for written assignments, which will include in-class activities (including occasional quizzes) and homework (including writing an essay, with 2 drafts), and 10% for individual participation, especially on your team, as assessed by instructor and TA observations, plus peer reviews) and 50% of your grade will be based on the quality of your team's work (see ** caveat below) (15% for your miniature spacecraft (designed, built (quality of construction, on-time delivery), tested, flown, data analyzed) – that is, all team graded assignments except for the team presentations listed below: 10% for one oral team presentation (pre-flight), 15% for the team's written documentation (spread over Rev. 0, A, B, C), and 10% for an end-of-semester oral presentation plus public exhibit. Point values for specific assignments will be announced as we go, but at the end of the semester all points in each category will be weighted according to the percentages listed above. Note: Scores will be recorded in the Canvas gradebook, but the weightings above will not be calculated by Canvas (so Canvas can estimate, but not formally calculate, your standing in the class).

** Any student who essentially does not contribute to their team's project may be subjected to additional penalties (i.e. up to not receiving points for the team project). This would be in addition to any deductions from the "10% for individual participation on your team" mentioned above.

Final Exam:

There will not be a final exam in this class. However, there will be several team presentations including an oral (pre-flight) presentation, a series of written "documentation" reports, plus an end-of-semester (i.e. post-flight) oral presentation delivered at (or perhaps in conjunction with) an end-of-semester public exhibit. There will also be occasional in-class quizzes, sometimes on Canvas. These will usually be open-notes (so take notes!) but will not always be announced in advance.

Class absence/make-up work policy:

Make-up opportunities will not be provided for unexcused absences. (Note: If you are placed in quarantine, but are not actually feeling ill, you should contact the professor in advance of class to discuss whether you should attend class remotely (by Zoom; in real time) or make up the work after-the-fact.) Not coming to class due to personal reservations about attending in-person events, **and also missing class to vote on Nov. 2 (which I encourage you to do – just don't miss class)**, are not considered excused absences by the University.

In the case of excused absences (see <https://policy.umn.edu/education/makeupwork>), class activities that cannot effectively be made up will simply not count towards your grade. Make-up of in-class activities, including quizzes and/or exams, will only be offered if all the following conditions are met.

- You have a valid reason for a class absence according to University policy: health issue, family emergency, sanctioned University event, religious observance.
- You contact the professor by phone or e-mail as soon as you know about the absence (nearly always before the class you miss, unless it is a genuine last-minute emergency – you may even know about impending absences at the start of the semester) to explain your situation and make an appointment to see the professor (definitely before the next week's class) to discuss options regarding what you missed. Do this even for unexcused absences, so as not to get behind.
- You provide valid documentation of your excused absence such as a note from a doctor or form UM 1886: [Self-Reporting of Medical Absence from Class](#) (posted on class website) when you are next in contact with the professor. Such documentation should be provided for every class period missed (i.e. once a week, for this class).

Late assignment submission policy:

All assignments will have specific due dates/times and deductions will be made if they are submitted late. These penalties are stiff, so don't turn in things late!

- -10% for assignments received (hard copy or electronically) on the correct due date, but later than the due time (e.g. after class, if due at the beginning of class)
- -20% for assignments received on the following business day (e.g. things submitted Wednesday, if due Tuesday; things turned in over the weekend or on Monday, if due Friday, etc.)
- -50% for assignments received later than the following business day, but within 1 week of the original due date (except at the end of the semester, when you only have 48 hours beyond the last class period to submit late work for partial credit)
- No credit for assignments more than 1 week late (or more than 48 hours beyond the last class period, at the end of the semester)

Checking Scores Online:

You can check your scores for assignments on Canvas (though remember that Canvas does not weight scores, so it's total is only an estimate of your current standing). It is a good idea to regularly check to make sure that each of your scores has been correctly entered in the system – errors in data entry can occur. *Questions or comments about grading must be raised within one week of scores being posted, after which grades will be considered final.*

Letter grades:

Letter grades will be assigned according to the following cutoffs:

95.00 – 100.00 % A	77.00 – 79.99 % C+
90.00 – 94.99 % A-	73.00– 76.99 % C
87.00 – 89.99 % B+	70.00 – 72.99 % C-
83.00 – 86.99 % B	65.00 – 69.99 % D+
80.00 – 82.99 % B-	60.00 – 64.99 % D
	00.00 – 59.99 % F

These cut-offs 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 semester. However, I very rarely exercise this right. Therefore, don't count on grading becoming more lenient than the percentages in this table.

*Feedback about this class, delivered in person or sent by e-mail, is always welcome.
< **The contents of this syllabus are subject to modification if the need arises.**>*