

Tentative Calendar for AEM 1301 (Freshman Seminar)
Introduction to Spaceflight (with Stratospheric Ballooning Build/Fly Project)
Fall 2021

version 6: 11/16/2021

Tuesday, Sept. 7

Introduction to class and ballooning (especially stratospheric/weather ballooning)
Discussion of space (& near-space), spacecraft (& near-spacecraft), spaceflight (...), etc.

Tuesday, Sept. 14

Team assignments and team-forming activities
Generic balloon mission overview: atmosphere, experiments, payload construction, flight, etc.
Discussion of sample payloads and past missions: eclipse ballooning, MURI, CubeSats, etc.
CAD basics activity (begin in class)

Tuesday, Sept. 21

Introduction to main payload-building assignment and team documentation/presentations
Demonstration of NEULOGs, PTERODACTYL flight computers, sensors, cameras, etc.
Practice payload layout using 3D mock-ups
Learn-to-solder activity (begin in class)

Tuesday, Sept. 28

Distribution and discussion of Team Project (Written) Documentation template
Team Project Documentation – Rev 0: Section assignments – hardcopy due by end of class
Distribution and discussion of Proposal/Conceptual Design Review (CDR) template
Some class time to work on Proposal/Conceptual Design Review slides (CDR)
Arduino programming/wiring activity (begin in class)

Tuesday, Oct. 5 (*Slides due by 1 p.m. – (i.e. BEFORE class)*)

Proposal/Conceptual Design Reviews (CDR) (oral presentations, with slides; 8-10 minutes per team)
Equipment/materials distribution
Begin work on payload body construction and component integration and testing

Tuesday, Oct. 12

Feedback about CDRs
Distribution and discussion of Flight Readiness Review (FRR) template
Some class time to work on construction, integration, and testing

Friday, Oct. 15

Team Project Documentation – Rev A: Design sections, due by 5 p.m.

Tuesday, Oct. 19

~~Flight prediction software, launch/tracking/recovery logistics, remote monitoring logistics~~ (MOVED TO NEXT WEEK)

Some class time to work on FRR and/or construction, integration, and testing

Tuesday, Oct. 26 (*Slides due by 1 p.m.*)

Flight Readiness Reviews (FRR) (12-14 minutes per team, “live” oral with slides)
~~Flight prediction software, launch/tracking/recovery logistics, remote monitoring logistics~~
Ballooning demonstrations in Balas Atrium

Some (not much) class time to finalize payloads; payload weigh-in/turn-in, if finished

NEW (optional, but potentially interesting): MnSGC (eclipse) ballooning demos & informational session

Thursday, Oct. 28

Final deadline for payload weigh-in/turn-in is noon

MAKE AN APPOINTMENT – SEND TEAM REPRESENTATIVES

Saturday, Oct. 30 (alternate flight dates – Oct. 31, Nov. 6, or Nov. 7)

Launch day (actual launch site and flight timing TBA) – approximate schedule will be: gather at Akerman ~7:30 a.m., pack then leave campus ~8:00 a.m., set up ~9:30 a.m., launch ~11:00 a.m., flight ~2.5 hours, recovery and return to the Twin Cities may take until late afternoon

{ Anyone student(s) who elect not to travel will monitor the launch/flight/tracking remotely and will be busy from 10 a.m. to 3 p.m. (at least) – do at least some data analysis while the flight is still in the air. }

Tuesday, Nov. 2

If flown: some class time for data extraction from payloads, data analysis tips, preliminary data analysis

If not flown: Discussion of Systems Engineering, especially as it applies to spacecraft systems

Introduction to Peer Reviewed Essay assignment, select partners and divide essay topics

Past-looking details about eclipse ballooning

Movie “BLAST” (begin in class; finish in class next week)

Friday, Nov. 5

Team Project Documentation – Rev B: Design/Build sections, due by 5 p.m.

Tuesday, Nov. 9

If not last week: class time for data extraction from payloads, data analysis tips, preliminary data analysis

If not last week: Discussion of Systems Engineering, especially as it applies to spacecraft systems

More details for Peer Reviewed Essay assignment

Future-looking details about eclipse ballooning

Movie “BLAST” (finish showing in class)

Tuesday, Nov. 16 (*Individual data visuals/graphs due by 1 p.m.*)

Discussion of Gravity, Orbits, and Mission Trajectory Design

Discussion of Outer Space Launch Vehicles: Past, Present, and Future

Feedback offered on data analysis visuals/graphs

~~Some class time to continue work on data analysis and generate data analysis visuals/graphs~~

Essay: first draft due by 8 p.m. to peer reviewer (copy to instructor)

Wednesday, Nov. 17 (or within 24 hours of receipt, if essay is submitted late)

Essay: peer reviewer comments due by 8 p.m. to author (copy to instructor)

Tuesday, Nov. 23 (*Individual data visuals/graphs due by 1 p.m.*)

Discussion of Launch Vehicles: Past, Present, and Future

Feedback offered on data analysis visuals/graphs

Discussion of Gravity, Orbits, and Mission Trajectory Design

Some class time to work on Rev. C

Essay: final draft due by 8 p.m. to instructor (optional copy to peer reviewer)

Tuesday, Nov. 30

Discussion of Telemetry and Communication Systems

Discussion of Re-entry and Landing Systems

In-class activity: Design a ballooning mission to another solar system body (begin)

Friday, Dec. 3

Team Project Documentation – Rev C: All sections, due 5 p.m.

Tuesday, Dec. 7

In-class activity: design a ballooning mission to another solar system body (continued)

Some class time to prepare for end-of-semester post-flight video (~5 min) and public exhibit

Tuesday, Dec. 14

Watch post-flight videos in class.

Course evaluations

End-of-semester public exhibit – invite people to attend!

Wrap-up discussion topic: Where do we go from here?

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