ECEN 4013

Design of Engineering Systems

Introduction

Nate Lannan
School of Electrical and Computer Engineering
Oklahoma State University

Mr. Jikui Zhao
Ms. Haya Monawwar
Graduate Teaching Assistants

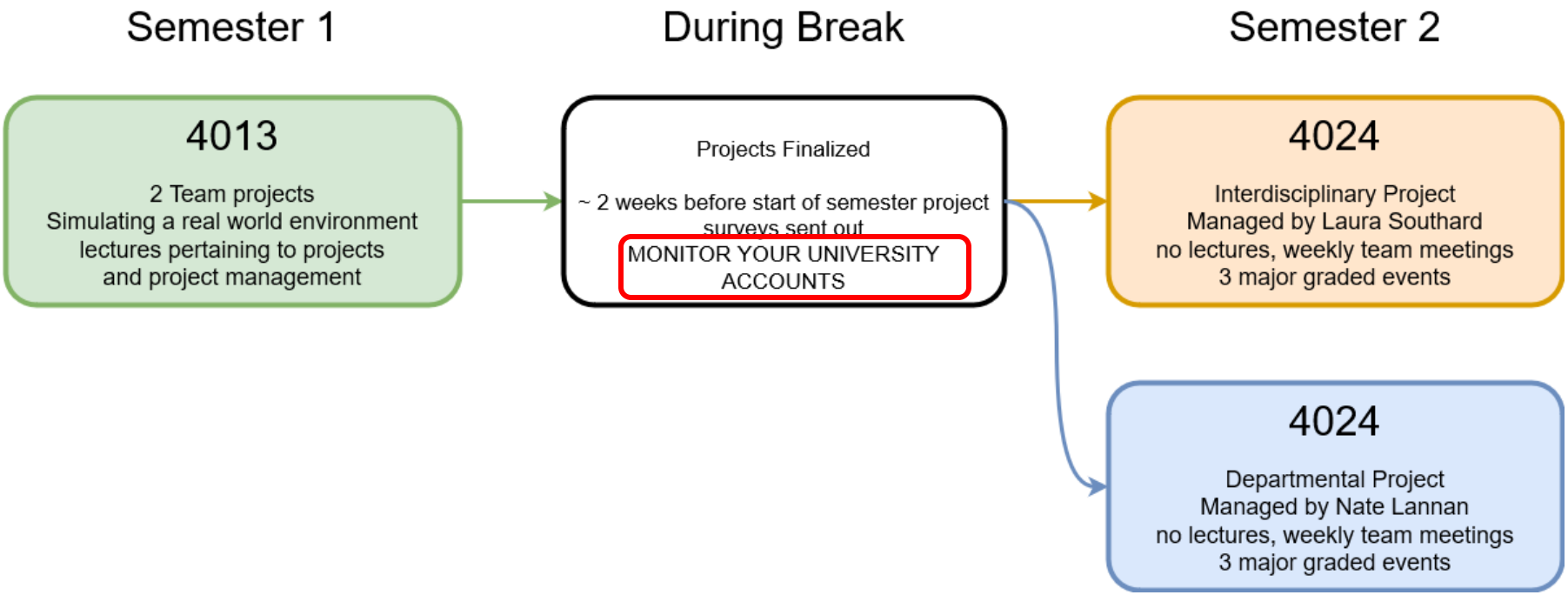
Mr. Kaden Rhodes
Parts Store Attendant

Attendance

In Person Format

Class Attendance:	Class will be held in person at MW 10:30am in LSW 202. Class will meet unless a cancellation is announced in a previous class, by e-mail or by direct OSU notification – for example, cancellations due to severe weather. Schedules and deadlines may be modified from time to time. Failure to participate as expected is likely to reduce your final grade.

ECEN 4013
Senior Design Flow



ECEN 4013
Design of Engineering Systems

Class:MW 10:30 – 11:20 Life Sciences West 202

Instructor: Nate Lannan
Assistant Professor of Practice
Office: ES 267
(405) 744-8040
nate.lannan@okstate.edu

Office Hours: TBD – I will make an announcement after scheduling my weekly Capstone team meetings.

ECEN 4013
Design of Engineering Systems

GTA: Mr. Jikui Zhao
ES 242
jikzhao@okstate.edu

Office Hours: TBD

GTA: Ms. Haya Monawwar
ES 242
haya.monnawar@okstate.edu

Office Hours: TBD

Stockroom: Mr. Kaden Rhodes
kaden.rhodes@okstate.edu

Stockroom Hours: MTWR 8am – 10am

Makerspace: Mr. Brian Norton
brian.norton@okstate.edu

Makerspace Hours: By appointment

Please include "ECEN 4013" in e-mail subject line for any correspondences

ECEN 4013
Design of Engineering Systems

Laboratory: ENDV 320 (ECEN 4013)
Laboratory 2: ENDV 170 (ECEN 4024)
Stockroom: ES 024 (West Basement)
Makerspace: ENDV 330

ENDV access: 24/7 access with your ID (Check this soon to make sure your ID works after hours)

Lab access: 24/7 - please check with me if you plan to access afterhours so that I can be sure it will be open.

Discord: https://discord.gg/gFU58Mbk

ECEN 4013
Lab Schedule

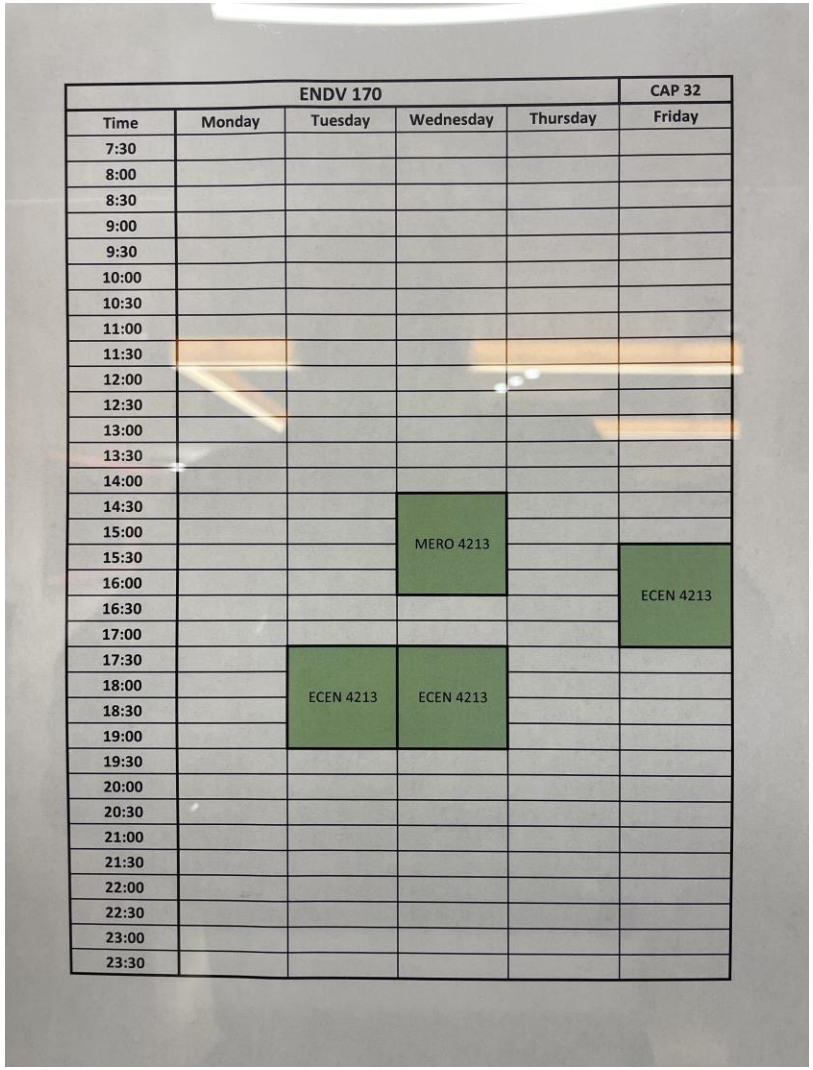
As Listed:	“4013 Lab	T	11:30-13:20”
	“4013 Lab	R	15:30-17:20”

ECEN 4013 is a lab class, and the Registrar’s Office requires lab hours be associated with the section.

HOWEVER, you will do your lab work at days and times of your team’s choosing.

Your teams do not need to schedule your lab work at the hours indicated on Banner. We will occasionally use this allotted time for project demos.

Lab Hours



ENDV 170					CAP 32
Time	Monday	Tuesday	Wednesday	Thursday	Friday
7:30					
8:00					
8:30					
9:00					
9:30					
10:00					
10:30					
11:00					
11:30					
12:00					
12:30					
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15:00					
15:30					ECEN 4213
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17:30		ECEN 4213	ECEN 4213		
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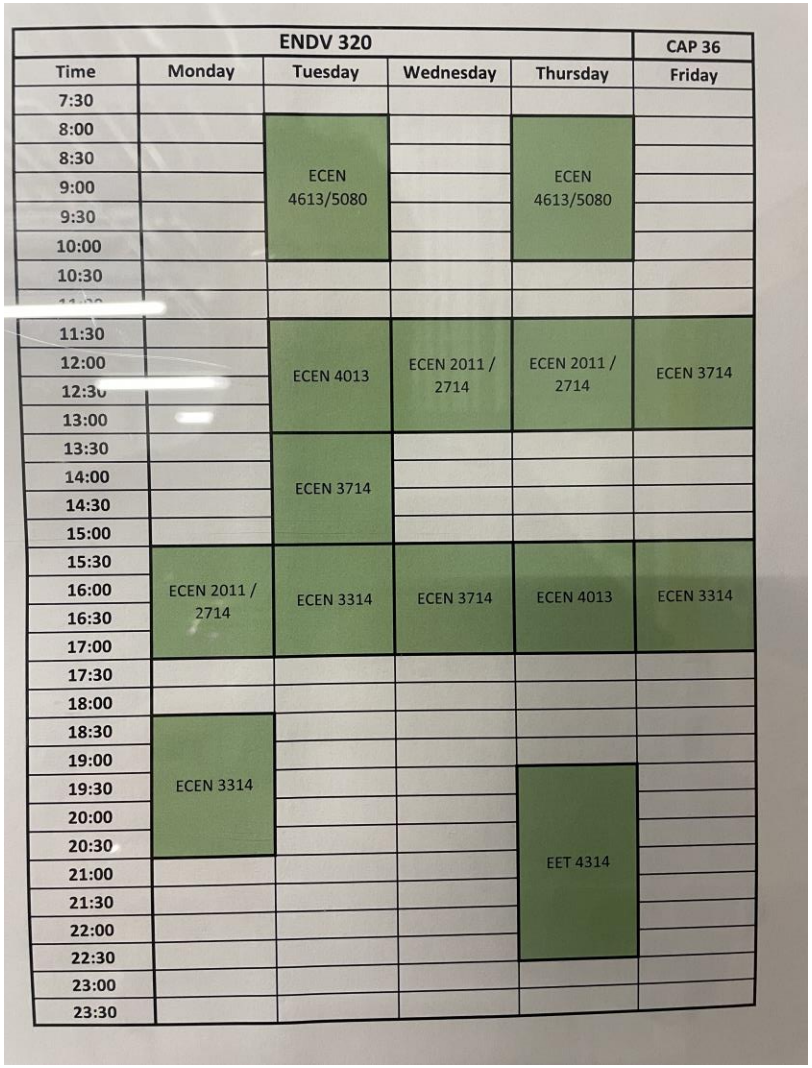

ENDV 320					CAP 36
Time	Monday	Tuesday	Wednesday	Thursday	Friday
7:30					
8:00		ECEN 4613/5080		ECEN 4613/5080	
8:30					
9:00					
9:30					
10:00					
10:30					
11:30		ECEN 4013	ECEN 2011 / 2714	ECEN 2011 / 2714	ECEN 3714
12:00					
12:30					
13:00					
13:30		ECEN 3714			
14:00					
14:30					
15:00					
15:30	ECEN 2011 / 2714	ECEN 3314	ECEN 3714	ECEN 4013	ECEN 3314
16:00					
16:30					
17:00					
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18:00					
18:30	ECEN 3314				
19:00					
19:30				EET 4314	
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23:00					
23:30					

ECEN 4013

Prerequisites:

English 3323 Technical Writing

Completion of required ECEN lab courses

Course Format:

Team-based laboratory and independent study design course which must produce a working result.

Textbook:

None required. An uncommonly useful reference is:

K. Fowler and C. Silver, Developing and Managing Embedded Systems and Products, Newnes, ISBN 978-0-12-405879-8

Syllabus Review

The ECEN 4013 syllabus is available on the Canvas site. Read it carefully. This class is unlike any other class you've taken at OSU. You need to be familiar with everything in the syllabus.

You are responsible for understanding the contents of the syllabus. If you have questions, send them to me before the next class session.

Syllabus Review

For example:

"Students completing this course should be adequately prepared to engage in largely independent work in ECEN 4024, the ECE Department's culminating design experience."

What's a culminating design experience?

Culminating Design Experience: a culminating major engineering design experience that
1) incorporates appropriate engineering standards and multiple constraints, and
2) is based on the knowledge and skills acquired in earlier course work.

ECEN 4013

Objective:

Prepare you for independent team projects in ECEN 4024

Professional topics:

- Circuit simulation
- Schematic capture
- Circuit board layout (through-hole and surface mount)
- Practical design and test fundamentals
- Team and organizational skills, including team formation
- Project management, archival, and documentation
- Engineering ethics, PE licensure, Intellectual Property
- Specifications, proposals, routine reporting
- Engineering and other standards (e.g., NEC)
- Project-based topics

ECEN 4013

Homework:

- A few occasional assignments, progress reports

Examinations, quizzes, written assignments, and short demos with TAs:

- No exams
- Safety quizzes for certification
- Ethics paper, 2 project reports
- 2 project demos

Coursework will largely consist of two team projects with randomized team members

ECEN 4013

“ENGINEERING IS THE SCIENCE OF TRADEOFFS”

Dr. Dale Kauffman
Kansas State University
Circa 1970

ECEN 4013

Scott Nowak's algorithmic definition of engineering

1. Take what you know
2. Apply it to what you don't know
3. Figure it out
4. Assimilate what you learned
5. Recurse

ECEN 4013

This class is unlike others you've taken …

Design engineering is a creative act.

There is no single correct solution for class projects. You are required to produce a specified result, but there are many possible solutions.

You will make mistakes.

You will experience problems and setbacks, **some of which are out of your control.**

ECEN 4013

… and there's the good stuff

You will experience the thrill of seeing your idea become a reality.

You will see – it's worth the effort.

It's why you wanted to be engineers – to create things.

ECEN 4013

CLASS GROUND RULES

Sources of Information

There is no text. You must figure out what you need and search to find it.

Locate and use sources of information as needed:
- books,
- technical journals,
- manufacturer's data sheets,
- application notes,
- resident experts (faculty and others).

Be careful to cite your sources as appropriate.

Teamwork

Your projects are team projects. You must work as a team to achieve a common goal.

Teamwork and cooperation are essential now and in your career.

Everyone on the team must do their part.

Your **performance**, not your time and effort, ultimately determines your grade.

Class Attendance

Be present and seated in the classroom at the scheduled start time.

You are responsible for making up missed class and team assignments.

Assume we will meet as scheduled unless a cancellation is announced in a previous class, by e-mail through your team's Point of Contact (POC), or by direct OSU notification (as for severe weather).

Class Attendance

Schedules and deadlines may be modified from time to time as circumstances require.

Failure to participate as expected is likely to reduce your final grade.

No milking the duck.

Time and Level of Effort

Design projects are very difficult to estimate accurately.

You must spend as much time as necessary to complete assignments, especially team projects, successfully.

Failure to work promptly and consistently is the primary cause of academic difficulty in this class.

Team Responsibilities

Team projects are given a team grade. Poor performance impacts your entire team.

Massive effort at the last minute will impact your other obligations, will reduce the likelihood of correcting problems late in the project, and almost always results in a poor product and a poor grade.

Team Responsibilities

All team members must contribute equally and fairly to the project. **Failure to contribute to your team project in a meaningful way is the easiest way to tank your grade.**

One person cannot and should not do it all. Everyone must contribute.

Speak up and participate. Listen to your teammates when they contribute an idea.

You are responsible for your team's success.

Agile Scrum

- Project framework designed in 2001
- Aim is to please the customer through early and continuous delivery and an emphasis on a shortened timescale
- Welcomes changing requirements
- Most efficient and effective method of conveying information is face-to-face conversation

Agile Scrum

We will be using Agile Scrum development for project management with iceScrum or Redmine software to track the projects.

IceScrum or Redmine will be used as a tool to break up your projects into smaller chunks. These chunks (called user stories in Agile Scrum methodology) will be further broken down into team tasks and tracked.

Everyone must demonstrate progress.

Grading

In the absence of disciplinary actions, grades are assigned using the components and weights given below.

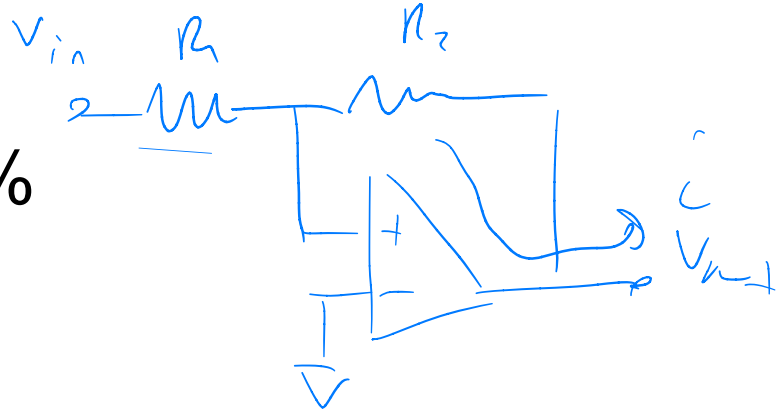
Homework, quizzes, progress reports	15%
Ethics Paper	15%
Team Project #1	30%
Team Project #2	30%
Peer Reviews	10%

Any necessary grading adjustments will be announced in class.

Grading

Scale:

A = 90 – 100%
B = 80 – 89%
C = 70 – 79%
D = 60 – 69%
F = 0 – 59%



$$\frac{V_{in} - 0}{R_1} = -\frac{V_{out}}{R_2}$$

Review the Syllabus for specific information.

$$V_{out} = -V_{in}\left(\frac{R_2}{R_1}\right)$$

Lack of Effort Circumstance

If there is significant lack of effort by some team member(s), and if the problem cannot be resolved within the team, the other team members may write a letter to the instructor providing details listed in the Syllabus. This is a last resort and is not to be taken casually.

How to really mess up your grade

Your performance and participation influences your grade in 3 ways:

- Peer reviews – 10% of your final grade. This is taken directly from your peers' evaluations. I do not modify these at all.
- Team member contributions – 15 to 25 points of your project grade. This is a combination of the TA's assessment and your peers' assessments.
- **If you receive a 55% or lower on your peers' evaluation, I reserve the right to weight your project demo and report grades by your evaluation grade.**
  - **Example – your team receives 50 points out of 50 for the demo but your peer evaluation is 25%, you would receive .25*50 = 12.5**

A FEW POLICY STATEMENTS

Academic Dishonesty/Misconduct

You are expected to uphold the highest standard of academic honesty, integrity, and professional behavior.

Cheating, plagiarism, and copying information without proper attribution will not be tolerated. Work you turn in should always be your own, never copied from someone else.

You must not claim, infer, or suggest that someone else's work is your own.

Violations will be handled in compliance with the OSU Academic Integrity Policy. The instructor may give a maximum penalty of a "F" course grade in such situations.

Accessibility

If any member of the class has an accessibility need or special accommodation, the instructor will work with you and the University Office of Student Accessibility Services to provide reasonable accommodations to ensure you have a fair opportunity to perform in this class. Please advise the Instructor of any such need and the desired accommodations at the earliest possible time.

End of the Introductory Things

This concludes introductory material contained in the Syllabus. The Syllabus available in Canvas may be modified as necessary. Any Syllabus modifications will be covered during lecture.

Read the Syllabus carefully.

Are there any questions so far?

Class Projects

The class projects are well within your capabilities. You must complete them by working as a team.

Y**our projects must work as intended**.

Class Projects - Parts

The ECE Department will allocate a project budget to each team.

Common parts are readily available through the department stockroom. Parts not in stock may be obtained through OSU. **Parts and materials purchased outside the OSU system will not be reimbursed.**

Class Projects - Parts

Purchasing issues are a common problem, for they impact schedules.

Parts not in the stockroom are purchased once a week. You should select in-stock parts available from **Mouser Electronics** whenever possible.

Early identification of parts for your project are the best way to avoid purchasing issues.

There is a parts purchasing procedure document on Canvas (PartsOrdering.pdf). Please read it.

Things Related to Teams

Teams will be formed randomly. Teams may not self-select. Teams for Project #1 and the project itself will be announced next meeting.

You will organize as a team:

Everyone is a design engineer. Divide the team responsibilities among yourselves:

- Point of Contact (POC - one and only one) - team communication and parts orders
- Hardware Manager/Code Architect - part records, equipment storage, repository management
- Scribe – meeting minutes, Gantt chart, primary control of report
- Scrum Master - team coordination, task organization

Things Related to Laboratory

At end of the semester, any equipment checked out must be returned in the same condition as when you received it. Lost or damaged items will be charged to your Bursar account.

Project parts purchased by OSU must be turned in prior to receiving your semester grade. A final grade of “I” will be assigned if all tasks have not been completed.

Things Related to Laboratory

Keep benches and the surrounding area - including the floor - clean and neat during the semester.

Shared equipment, such as soldering stations and 3D printers, should not be left in a mess. Every user must clean the work area and leave it in good shape for the next user.

Things Related to Laboratory

Our labs are now located in ENDEAVOR and we are subject to their rules. Access to ENDEAVOR requires on-line safety training.

Use of shared equipment in ENDEAVOR (3D printers, room 330) requires you to pass certification training. Certifications can be revoked by GTAs and/or instructors in the event of unsafe operation or abuse.

Engineering Wisdom

Problems will occur – **allow time** to deal with them.

"The first 90% of the project takes 90% of the time. The last 10% of the project takes 90% of the time."

- Tom Cargill

"Hofstadter's Law: It always takes longer than you expect, even when you take into account Hofstadter's Law."

- Douglas Hofstadter

Engineering Wisdom

Murphy's Law: If anything can go wrong, it will.

Murphy was an optimist.

"When you want to know how things really work, study them when they're coming apart."

- William Gibson

Homework

1. Fill out survey and attach a photo so I can learn your names. Due Aug. 23

Name:
(As it appears in Canvas)
Nate Lannan

Preferred Name:
Nate Lannan

Preferred contact email:
nate.lannan@okstate.edu

Major and focus:
Electrical Engineering - Human motion enhancement

How I got into engineering:
My attempts at becoming a rock star failed, so I went to audio engineering trade school. While there, I got curious about how all the electronics worked so I decided to pursue a

Homework

2. Create a github account and send me your profile name (Details on Canvas) Due Aug. 21

3. Install Multisim and Kicad and do the tutorials on Canvas (NI Circuit Design Suite.pdf, getting_started_in_kicad.pdf)

4. Login to http://daleksec.es-private.okstate.edu:8080/icescrum/ and create a user account. This must be done on the OSU network. Instructions for connecting to the OSU VPN are included in the Canvas description of the assignment – Due Aug. 21

Homework

5. Certifications:

Please join the Canvas page for NCL, Endeavor, and CLL:
Endeavor - https://canvas.okstate.edu/courses/190315
NCL - https://canvas.okstate.edu/courses/143725
CLL - https://canvas.okstate.edu/courses/190587/pages/main

Then take the safety quizzes to begin the certification process.
CLL - https://canvas.okstate.edu/courses/190587/pages/cll-safety-orientation-and-quiz

Get certified **AM level 1** to use additive lab.
Endeavor - https://canvas.okstate.edu/courses/190315/pages/additive-manufacturing-maker-space-endv-120

Pass Solder Safety Quizzes to use ENDV 330 (Soldering Safety Quiz and Solder General Operations Guide).
Endeavor - https://canvas.okstate.edu/courses/190315/pages/electronic-maker-space-and-soldering

Upload proof of completion of the quizzes (screenshot, or copy of quiz) to Canvas by Aug. 23

Your Homework Assignments due before next meeting

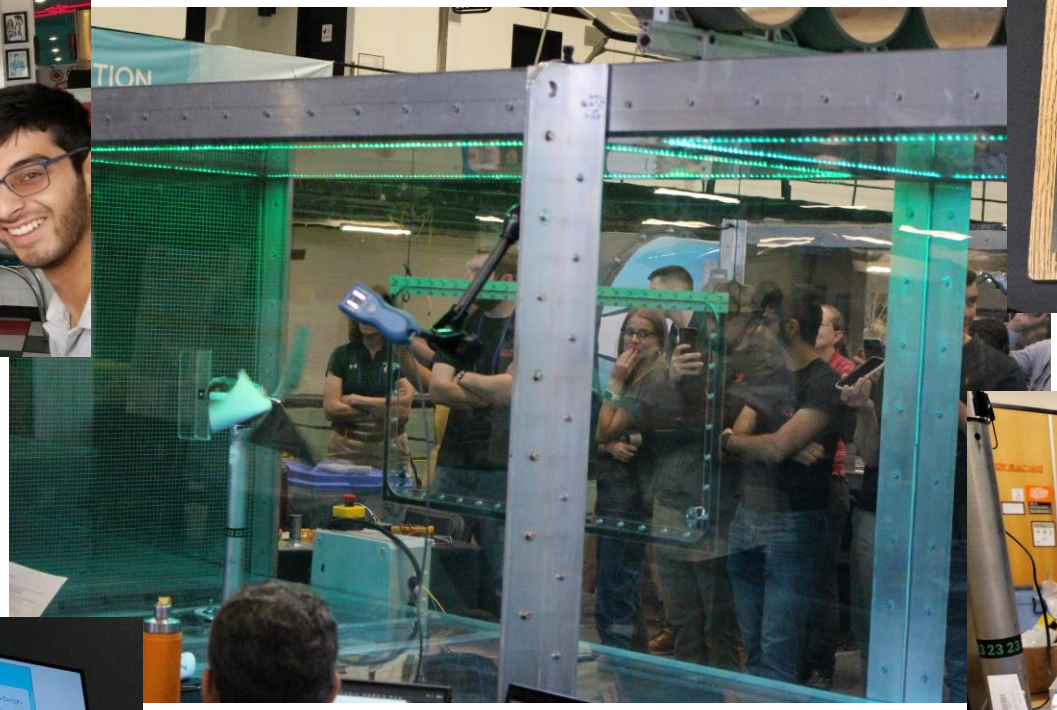
Create a Github account and send me your username via email (details on canvas).

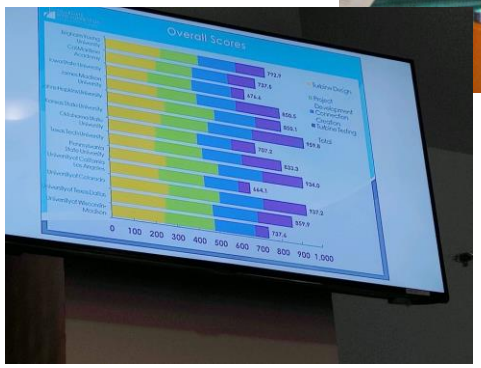
Create an IceScrum user on daleksec.

Opportunities

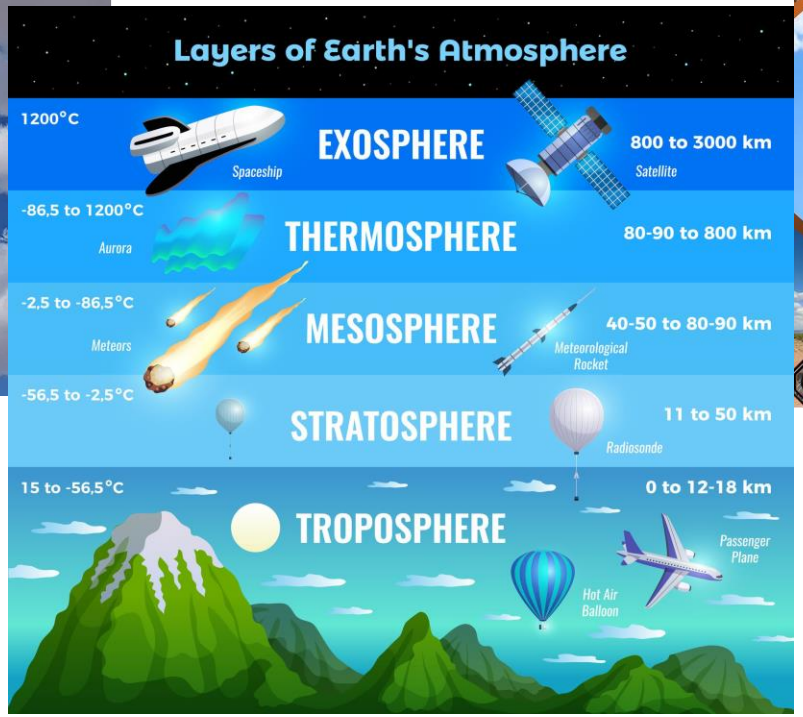
- Cyclone Cowboys
- Cowboy Rocketworks

Opportunities





Opportunities



https://www.instagram.com/cowboy_rocketworks

gavin.stearman@okstate.edu

QUESTIONS?