Welcome to Engineering
1182 or 1188
Today’s Plan

 Welcome and Teaching Team Introduction

 Class Style and Expectations
  • Important Websites
  • Classroom Login

 Overview of the Course
  • Syllabus

 Introduce the Design-Build Project

 Technical Communications
The First-Year Engineering Program

Focus

Semester 1
- Problem Solving with Engineering Tools
- Hands-on Laboratories
- Technical Communications
- Teamwork

Semester 2
- Visualization and CAD
- Design and Build Projects
- Technical Communications
- Teamwork
Online Course Management Systems
(The EEIC Course and Carmen websites)

• Online tool for most course resources such as course assignments and lecture materials are in the EEIC Courses website.

• Online tool for some course resources such as gradebook, quizzes, journals and NEWS are in Carmen.

For 24/7 access using your OSU login

EEIC https://eeiccourses.engineering.osu.edu

Carmen https://carmen.osu.edu
Teaching Team Introduction

1. Instructor

2. Graduate Teaching Associate (GTA)

3. Undergraduate Teaching Associates (UTA)
Logging on in any Hitchcock classroom

**WINDOWS 7**

Windows 7 Logon

Press <CTRL> + <ALT> + <DELETE>

Then fill in the logon window with

Your User ID *
Your Password (case sensitive text) *

* As illustrated on the following slide
Entering your default password

Brian O’Buckeye

Username (OSU name.#): obuckeye.1
Default Password:

0888134079.b

Capital Last Name Initial: O
Student ID Number: 888134079
Period
Lower Case First Name Initial: b
Computer Access

- First Year Engineering Students have access to:
  - Hitchcock 224 and 308 during scheduled class time hours
  - Hitchcock 324 Student Computer Lab
    - Open 24/7 BuckID Swipe Access
    - Staffed with Teaching Associates [Monday – Friday] for homework help
Your Class Schedule for Today
(Three Phases enumerated in the EEIC website:.)

Student: Please logon to the EEIC Courses website

1) **Before class**

2) **Topics covered and activities begun in class**

3) **After class**
CARMEN ORGANIZATION

Quizzes/Journals and Dropbox

Grades

Content and Additional Information

Upcoming Events such as Journals or Quizzes due dates

Trouble opening documents on Carmen?

Internet Explorer is the best choice of browser for PC users wishing to access Carmen, but problems can occur if Internet Explorer is set up incorrectly. Please make https://carmen.osu.edu a "Trusted Site" in the Internet Options of your browser.

To do this, just follow these step-by-step instructions:

1. In your browser Window, click on the "Tools" menu, and select "Internet Options..." Select the "Security" tab, and click on the icon labeled "Trusted sites."
2. Click on the "Sites..." button. In the text box titled "Add this web site to the zone", type https://carmen.osu.edu, and click on the "Add" button. Click "Ok."
Understanding the Syllabus

- It is your responsibility to carefully review and follow the syllabus and the Class Schedule!

- A minimum grade of **50%** is required in the following course components to receive a passing grade for this course:
  - Class Assignments
  - Design Project
Advanced Energy Vehicle (AEV)

Lab 00: AEV Project Introduction
AEVs are small (< 500 grams), autonomous, electric motor-powered, propeller-driven vehicles that are suspended from and maneuver along a monorail track systems hung from the laboratory ceilings.
AEV Learning Objectives

- **Project Management and Teamwork**
  - Time management, task scheduling, communication, etc.

- **Design Process and Cycle**
  - Identifying requirements/constraints, brainstorming, initial designs, build/test/analyze, final design, etc.

- **Project Documentation**
  - Project Portfolio, design review phase documents, final reports, extra credit video, etc.
AEV Design Cycle
Problem solving is an iterative process. At any point you may need to go back to a previous step (even the beginning!) and re-work the problem.

Reworking the problem will provide a better solution than rushing through the steps. Your first solution may not be your best solution!

See Lecture 02 from ENGR 1181 for more in depth description of DR PIE.
Let us apply DR PIE to the AEV Project.
AEV Design Review Phases

- Demonstrate the design process through a series of review phases

- A design review is described as a:
  "documented, comprehensive examination of the design to evaluate the adequacy of the design requirements"

- The Mission Concept Review (MCR) is an example of an early review phase; and, in this case, is provided.
AEV Design Review Phases

Procedure

- AEV design teams will demonstrate the design by:

1. Understanding the *Mission Concept Review (MCR)* to create an AEV to complete mission objectives and to meet design constraints

2. Developing *Test Readiness Review Documents (TRR)* to demonstrate that the team is prepared to meet the Performance Test Objectives

3. Developing a *Preliminary Design Review Document (PDR)* from laboratory tests and Performance Test 1

4. Developing a *Critical (Final) Design Review Document (CDR)* from detailed investigations in design, including the PDR, and Performance Tests 2-4
AEV Design Review Phases Overview

- Mission Concept Review (provided)
- Final Documentation
DEFINE: Mission Concept Review (MCR)
DEFINE: Mission Concept

Review

Background:

- Galactic Empire is rebuilding their army after the destruction of the Death Star
- Rebel alliance needs to be prepared
  - Construction is done on remote planets
  - Power very limited
- Alliance using a monorail system to transport newly constructed R2D2 units from one side of the planet to the interceptor aircrafts
Vehicle Constraints

1. The AEV must traverse along a monorail track system.
2. The AEV must be able to operate both forward and backward along the monorail track system.
3. The main propulsion system must be air driven (propeller) and hang below the track system.
4. The vehicle must utilize provided Li-PO batteries to supply the power to the electric motors.
5. The Arduino Controller must **not** be placed on the vertical support arm.
6. There must be a clearance area of **two by two** inches between the Arduino Controller and the caboose connection (magnet). The **front** of the AEV will have a mating erector set part similar to the bracket shown below, but without a magnet. The Caboose will initially be positioned the entrance of the junkyard.
Track is split into 4 parts
- Outside Right (Green)
- Inside Right (Purple)
- Outside Left (Blue)
- Inside Left (Red)

Scenario is the same for all, just different distances
Handout:

1. AEV Kits

2. DISCLAIMER for replacement of lost or damaged kits
AEV Components

- Classroom Components
  - Desktop Tracks
  - Li-PO Battery and Chargers

- Kit Components
  - AEV-Kit
    - Automatic Control System
    - Structure Pieces
    - Hardware
    - Electric Motors
    - Propellers
    - Monorail wheels
    - Hand Tools

These components are to stay in the classroom at **ALL** times.
AEV Components
Final Test and Competition Tracks

- Tracks:
  - Desktop
  - Classroom

- Desktop Track
  - Each desk has a desktop stand to use throughout the AEV design process

- Classroom Track
  - The laboratory has suspended track(s) for design and operational testing
AEV Components

AEV Structure and Wheels

- AEV
  - Structure and Wheels
  - Propulsion System
  - Energy Storage
  - Automatic Controller
  - Motor Driver
  - Aerodynamic Bodies
AEV Components

AEV Propulsion System

- **AEV**
  - Structure and Wheels
  - **Propulsion System**
  - Energy Storage
  - Automatic Controller
  - Motor Driver
  - Aerodynamic Bodies

Brushless Electric Motor

2.5” and 3”, Diameter Propellers
AEV Components
AEV Energy Storage

- AEV
  - Structure and Wheels
  - Propulsion System
  - **Energy Storage**
  - Automatic Controller
  - Motor Driver
  - Aerodynamic Bodies

2-Cell Lithium-Polymer Battery
Capacity: 800mAh
Voltage: 7.4V (nominal)
AEV Components
AEV Automatic Control System

- AEV
- Structure and Wheels
- Propulsion System
- Energy Storage
- Automatic Controller
- Motor Driver
- Aerodynamic Bodies

Arduino Nano USB

Motor Driver
AEV Components
AEV Aerodynamic Body Components  OPTIONAL

OPTIONAL components ▪ AEV
  ▪ Structure and Wheels
  ▪ Propulsion System
  ▪ Energy Storage
  ▪ Automatic Controller
  ▪ Motor Driver
  ▪ Aerodynamic Bodies

OPTIONAL components for AEV Design
Home-built or Team Bought

Innovative thought encouraged
AEV Components
AEV Aerodynamic Body Components  OPTIONAL

- AEV
  - Structure and Wheels
  - Propulsion System
  - Energy Storage
  - Automatic Controller
  - Motor Driver
  - Aerodynamic Bodies

3D Printing
Laser Cutting
AEV Components
AEV Extra Components  OPTIONAL

Servo
Can be used as (not limited to):
• Brake
• Rotate motors

Run Video from 0:41-1:02
Note: Students only have access to one servo NOT two
PLAN: Brainstorming Activity
Connecting the components to AEV

- Now that the problem has been *defined*, and you have *represented* the components of the AEV, brainstorm the design plan.

- As a group, on each sticky note write one thing that may be tested, designed and modified for your AEV.
Technical Communications
Technical Communication is Different

- High School Writing
  - Expository
  - Double spaced
  - Essay format
  - Descriptive
  - Length requirement

- Technical Communication
  - Informative
  - Often single spaced
  - Professional format
  - Concise and precise
  - Short is preferred
Executive Summaries

- Problem or objectives statement
- Lab procedure
- Results
- Obstacles and solutions
- Improvements
- Attachments
Lab Memos

- Heading
- Introduction
- Results
- Conclusion and Recommendation
- Appendix
Lab Reports

- Title Page
- Table of Contents
- List of Figures and Tables
- Executive Summary

- Introduction
- Results
- Conclusion
- References
- Appendix
Report and Memo Resources

- On Website
  - See Technical Communication Guide
- Instructional staff, especially GTAs for direction
- Grader for feedback
Project Portfolio

- Project portfolio is done on u.osu.edu
- Keeps track of all AEV documents and team’s progress
- Can use to show future employer
Team Meeting Notes

- Should include the following:
  - Objective of the meeting (few sentences)
  - Tasks completed
    - Bullets with each task
    - Assigned person to each task
    - Short summary of status
  - Tasks to be completed for upcoming week
    - Bullets with each task
    - Assigned person to each task
  - Timeline/gantt chart with major milestones (in necessary)
Technical Communications
Do’s and Don’ts
Photos should...

- Be clear with good contrast
- Only include necessary equipment
- Indicate scale
Cold
Getting warmer...
Warmer still...
Hot
Reducing Noise: Presenting Clearly?
Reducing Noise: Presenting Clearly

- I can read this (32 pt.)
  - I can read this, too (28 pt.)
    - We are getting small, but still readable (24 pt.)
      - This is getting too small to read (20 pt.)
        - Please be kind to your audience (16 pt.)
          - Don’t go below 20 point font (12 pt.)
Reducing Noise: Presenting Clearly

- Don’t blind your audience.

Reducing Noise: Presenting Clearly

- Watch size and complexity of figures and tables.
- Use few words.
Questions ??
For next week

- Lab 01: Creative Design Thinking
  - Bring kit (required for all labs)
  - Review Lab 01 material in the Lab Manual
  - Quiz 01
    - Study:
      - Lab Overview (Lab Manual)
      - Safety Rules (Lab Manual)
      - Mission Concept Review (Lab Manual)
      - Lab 01 + Appendix for Lab 01 (Lab Manual)