

# World of Engineering

## Lecture 1: Course Philosophy, Structure, and Expectations

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All announcements, links, submissions, and updates will be managed via Google Classroom.

## Summary

**Classroom Code: 2e26y5bh**

**Join today** so you do not miss deadlines, schedules, or showcase instructions.

# Why “World of Engineering”?

Engineering is not about solving predefined problems. It is about **deciding what problem is worth solving** and then building responsibly under constraints.

## Insight

This course introduces engineering as a way of thinking, building, failing, explaining, and improving.

# How Is This Different from Other Courses?

## Engineering Graphics

- focus: representation and technical drawing
- goal: communicate geometry and specifications correctly
- typical question: *“Is this drawing accurate?”*

## Prototyping / Maker Courses

- focus: fabrication and implementation
- goal: build an artifact that functions
- typical question: *“Does this device work?”*

## World of Engineering (ES 117)

- focus: problem framing, decision-making, and iteration
- goal: build the **right system** for the **right problem**
- typical question: *“Should we build this at all, and how do we know it works well enough?”*

# Real Money, Real Responsibility

This course involves working with **real institutional money**.

## What this means:

- funds are provided by the institute
- every purchase must be justified
- invoices and proof of payment are mandatory
- expenditures must be pre-approved

### Warning

This is public money. It must be used carefully, transparently, and responsibly.

**Learn the full engineering arc:** from **ideation** to **prototyping**, from **defining the right question** to **finding and defending an answer**.

**Learn to build. Learn why building is hard. Embrace failure: but explain it. Then build better.**

# Engineering Is a Process

Engineering unfolds over time through:

- problem discovery
- design choices
- failed attempts
- evidence-based iteration

## Insight

This course is structured as a progression, not a collection of disconnected lectures.

# The Four Phases of ES 117

**Phase 1: Ideation** What problem matters? Who is affected?

**Phase 2: Conceptualization** How might this system work? What assumptions are we making?

**Phase 3: Building and Iteration** Prototype, test, fail, redesign.

**Phase 4: Communication and Showcase** Explain what you built and what you learned.

# Lecture Component: Foundations of Engineering Practice

offered **separately** in Hindi and English.

## Core themes covered:

- foundations of **ideation** and problem framing
- **conceptualization**: from idea to system-level thinking
- **prototyping**: purpose, limits, and iteration
- **pitching**: communicating engineering decisions clearly

## Professional realities:

- regulations, standards, and engineering codes
- costs, overheads, approvals, and constraints

## A critical distinction:

- **jugaad** vs. **frugal innovation** vs. **engineering**
- strengths, limits, and risks of each approach

# Four Months from Now

At the end of this course, you will have:

- a working prototype
- evidence of iteration
- a clear engineering narrative
- a 2-minute pitch video shared publicly

## Insight

The goal is not winning. The goal is engineering maturity.

# Teams and Expectations

## Team size:

- Software projects: **10 students**
- Hardware projects: **25 students**

## Expectation calibration:

- Software: higher expectations (AI, lower logistics)
- Hardware: higher uncertainty, heavier logistics

# Reflections (Impressions)

Four handwritten impressions (~2 pages each):

- after ideation
- after conceptualization
- after major iteration
- before final showcase

## Warning

No AI tools are permitted for reflections. We evaluate your own thinking.

# Final Showcase

The semester concludes with a **Final Showcase**:

- working systems on display
- 2-minute pitch videos
- external evaluators

## Summary

This is a showcase, not a competition.

# Professional Conduct

## Zero tolerance:

- no phone usage
- no entry after scheduled start
- no movement once discussion begins

## Attendance:

- may be taken anytime
- more than 2 absences → **F grade**

# Assessment Breakdown

- Individual assignment: 5%
- Reflections (1 & 2): 5%
- Peer evaluation: 20%
- Instructor 1: 25%
- Instructor 2: 25%
- Final Showcase (external): 20%

# What We Expect from You

- presence (physical and mental)
- honesty in team responsibilities
- seriousness in discussion
- sustained progress, not last-minute work

## Insight

This course treats you as engineers in training, not passive students.

## Teamwork: A Few Honest Truths

When you work in teams, a few things will happen.

### Team reality:

- you will make friends
- you will make enemies
- you will make **frenemies**

### On communication:

- language is rarely the real barrier
- **lack of clarity** usually is

Language is no bar in this course. Reflections may be written in **any language of your choice.**

# Handling Issues: What Usually Works

## **Before escalating:**

- clarify roles, expectations, and deadlines
- document decisions and action items
- attempt one direct, respectful conversation

## **If issues persist:**

- involve the team coordinator
- use peer feedback and reflection to course-correct

## **Final resort:**

- reach out to instructors with
  - specific examples
  - evidence of prior attempts to resolve

We will engage seriously when issues are well-articulated and other reasonable options have been attempted.

# Next Steps

Before next class:

1. Look out for forms
2. think of two problems worth solving
3. reflect on who is affected and why
4. be ready to discuss openly