ME463 SPRING '24 INFORMATION SESSION

FOR FALL '24 PROJECTS

PURDUE UNIVERSITY | Mechanical Engineering

Senior Design
ME463

AGENDA

1. **ME463 Overview**
2. **Project Types**
   A. Industry-sponsored
   B. Student-Initiated
   C. Research-sponsored
   D. “Free Agents”

1. ME463 OVERVIEW

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UNDERGRADUATE PROGRAM MAP

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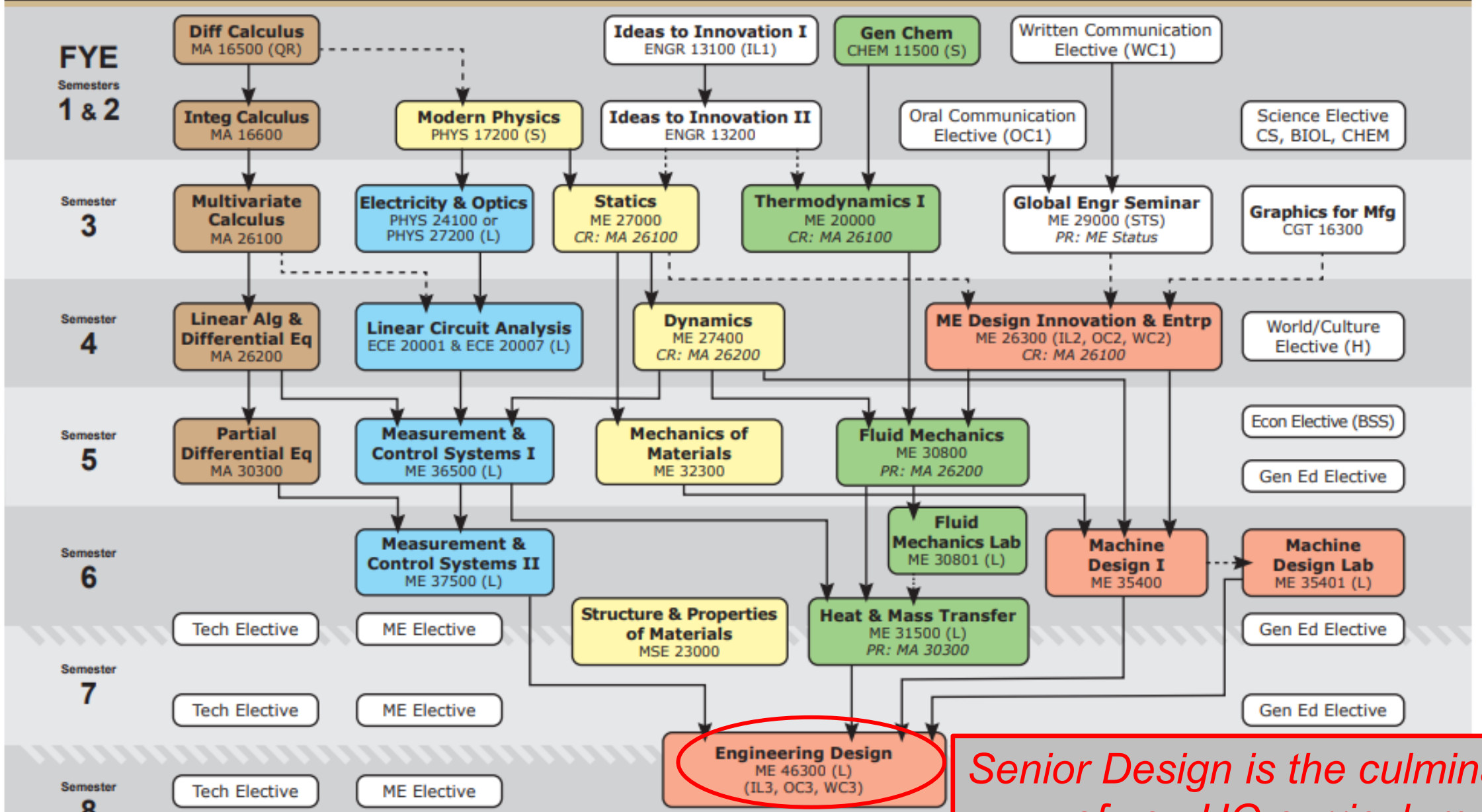
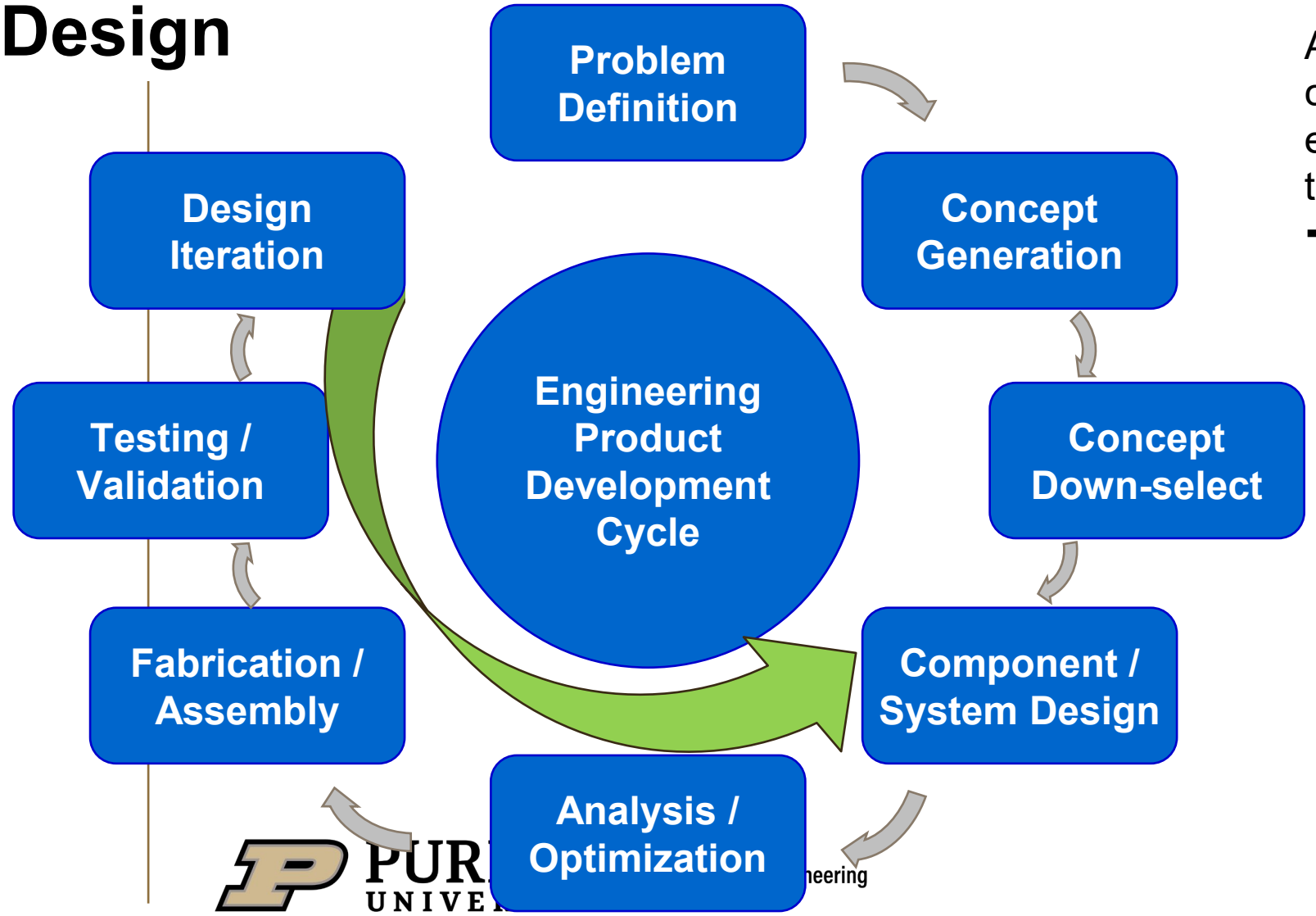


Senior Design is the culmination of you UG curriculum

Source: https://engineering.purdue.edu/ME/Undergraduate/ProgramMap
Updated Feb 2021

WHAT YOU DO IN SENIOR DESIGN

Design



Apply your engineering knowledge to create a unique solution to an open-ended design problem that is useful to the world.

➔ **Innovate, Design, Build, & Test**

WHAT YOU DO IN SENIOR DESIGN

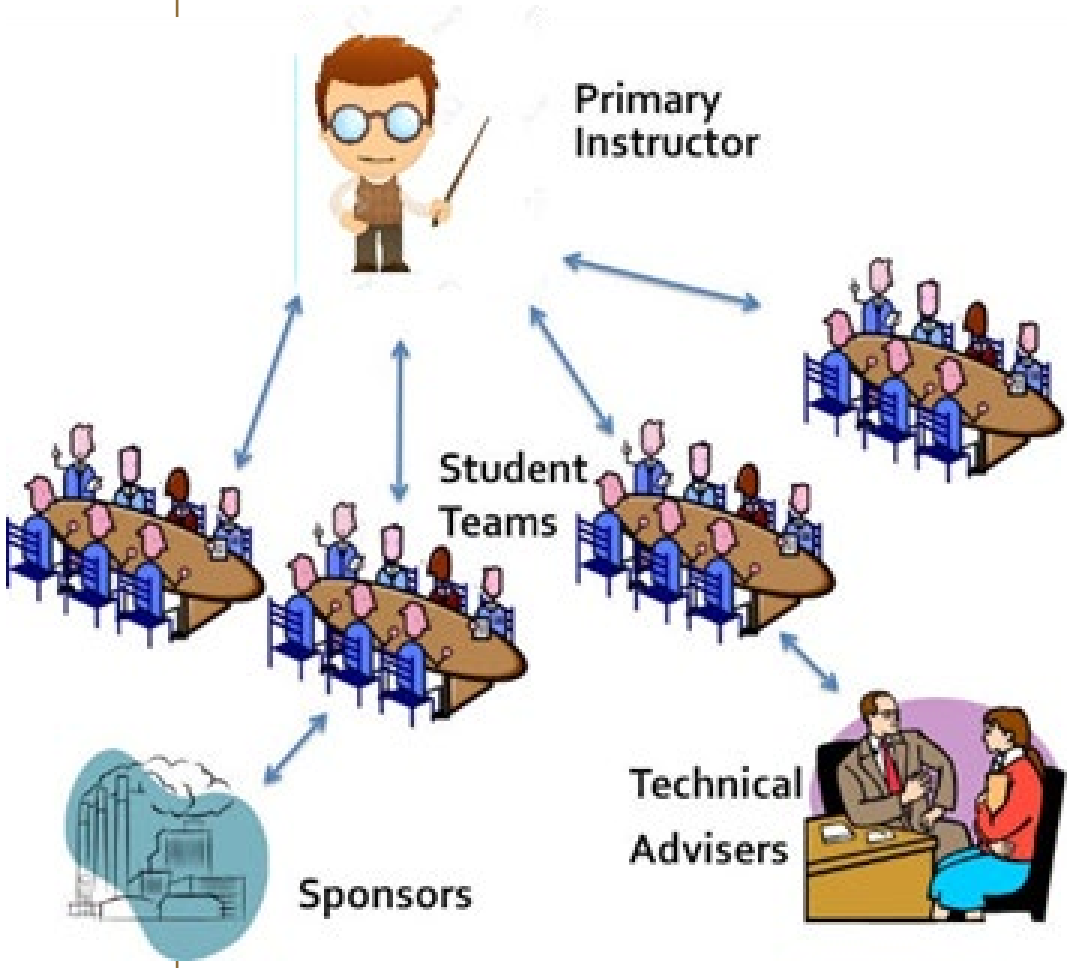
Teamwork

Project Management

Business Acumen

Craftmanship

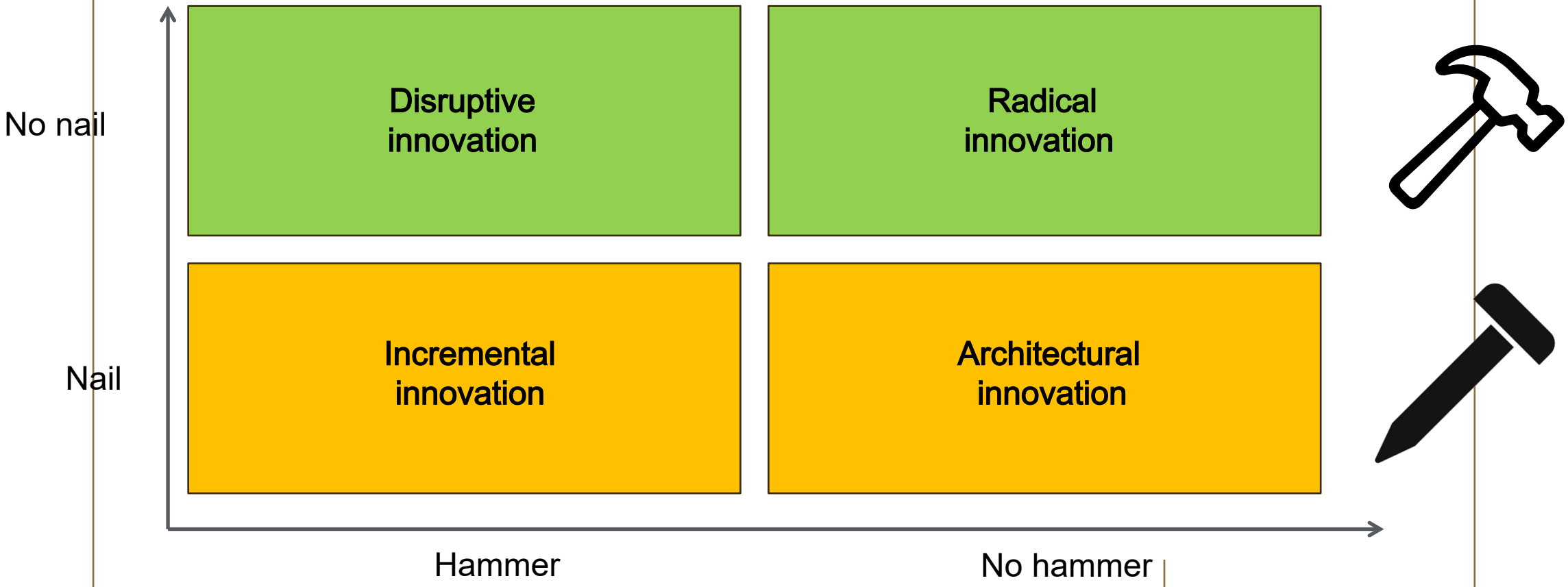
COURSE STRUCTURE



- Instructor serves as “coach” to provide overall guidance
- When sponsored, industry provides technical liaison
- Students are encouraged to seek technical advice from mentors, professors, and shop managers
- Teams determine and self-manage the roles & responsibilities of each member

Seeking innovative ideas/projects

Tool vs target



Seeking innovative ideas/projects

- **Incremental innovation** : Using existing technologies to increase value to the customer. Try existing tools to get improved results (i.e. use different brand of hammer for different nails).

- **Architectural innovation** : Apply new technology or process to existing products. (i.e. Invent a new tool to drive a nail).

- **Disruptive innovation** : Use existing technology to invent a new product. Use a hammer for the task but maybe the target isn't a nail. You're going to get a different result.

- **Radical innovation** : Apply new technology to invent a new product. That is, you are inventing something that is NOT a hammer and looking into application that is NOT a nail.

2. PROJECT TYPES

WHAT MAKES A GOOD ME463 PROJECT?

- **It requires application of your engineering education**
- **It is innovative**
- **It is the right size – the full design cycle (Design, Build, Test) can be completed by a 5-person team in 16 weeks**
  (expected workload is 18-20 hours/person/week)
- **It can be built and tested safely with resources available to Senior Design**
- **The final product will add unique value to a business and/or society**

➔ **More details on ME463 website:**
https://engineering.purdue.edu/ME463/project_selection

Note: Course policy prohibits projects involving weapons or significant safety risk.

See https://engineering.purdue.edu/ME463/criteria for more info

WHAT MAKES A NOT-SO-GOOD ME463 PROJECT?

- It is one where there are many products in the marketplace
- It is one that 463 teams have performed multiple semesters
  - Pill dispensers
  - Hydroponics
  - Plant watering systems
  - Wheelchair projects
- How about reducing smash and grab ventures?
- Cold-weather EV charging station?

PROJECT TYPES

Pre-arranged

- **Industry sponsored**
- **Student initiated**
- **Research sponsored**

"Free Agent"

Pre-arranged projects: Projects and project teams that are approved before course registration so that team members are scheduled into the same ME463 section.

PROJECT TYPES AND IP (GENERAL RULES)

Industry-sponsored project

- Students assign IP to sponsor
- IP Assignment is by virtue of industry project choice
- NDA must be signed by students
- If patents ensue and student contributions amount to co-inventorship then they are listed

Student-initiated project

- Students own the IP

Transfer ownership?

NO

- Students pursue as they please

YES

- File disclosure
- PRF Review

Pursue patent?

No

- Return to students

YES

- USPTO filing by PRF

Research-sponsored project

- Students or Purdue own IP
- Ownership is fact-dependent, confer with PRF OTC

INDUSTRY-SPONSORED PROJECTS

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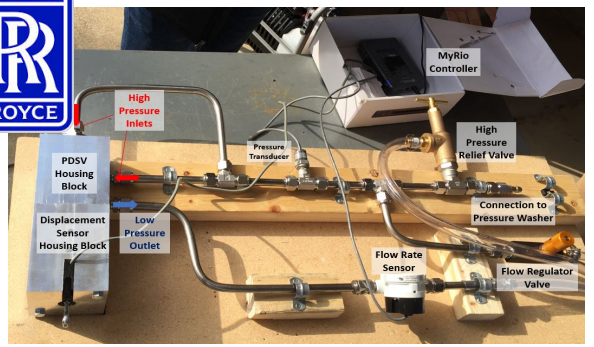
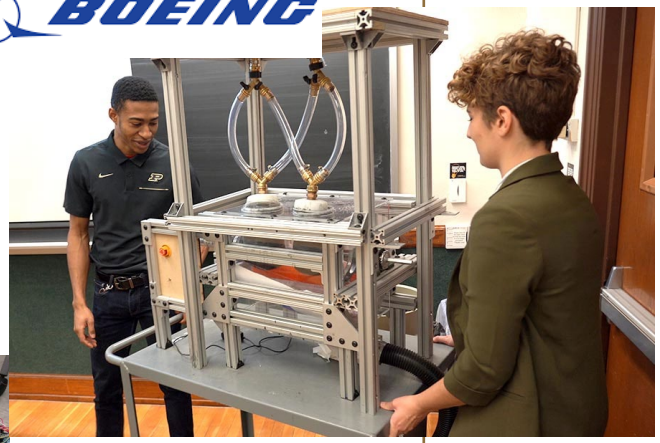
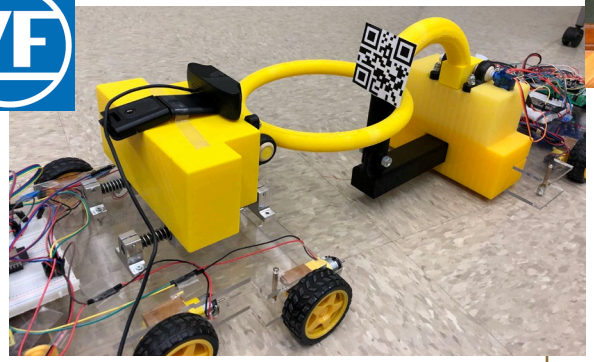
INDUSTRY-SPONSORED PROJECTS

- **Student benefits**
  - Additional mentoring
  - Strengthens your relationship with an employer
  - Industry experience
  - Increased chance your work will reach the marketplace
- **School benefits**
  - Greater industry support and involvement
  - Enhances relevance of Senior Design
  - Better/More well-defined projects







INDUSTRY-SPONSORED PROJECTS

If you'd like to nominate a company, complete the Qualtrics survey by MIDNIGHT February 20th

https://purdue.ca1.qualtrics.com/jfe/form/SV_a4fdTr8jyIZo62i

When speaking with employer, provide the following from ME463 website

(https://engineering.purdue.edu/ME463/project_selection):

- **Industry Sponsored Projects Brochure**
- **Industry Sponsorship Information**
- **Next steps: Todd Nelson will email employer to inquire their interest. If interested, a meeting will be scheduled. If a project is pursued and approved, Todd will notify students by March 25th.**
- **ME point of contact: Todd Nelson nelso366@purdue.edu**

Questions? Contact Todd Nelson (nelso366@purdue.edu)

STUDENT-INITIATED PROJECTS

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STUDENT-INITIATED PRE-ARRANGED PROJECTS

- **Process for approval of Student Initiated Projects:**
  - Fill out *Project Submission Form* from ME463 website (https://engineering.purdue.edu/ME463/submit_project)
  - By **midnight March 8th**, email completed form to Professor Jensen jensen23@purdue.edu & Professor Hirleman hirleman@purdue.edu
  - Senior Design committee will review submissions, ask follow-up questions, and respond with approval or denial by March 25th
  - **Projects must have 5 team members at submission.**

Questions? Contact Professor Jensen (jensen23@purdue.edu) and Prof. Hirleman (hirleman@purdue.edu)

SPORTS TECH

Euiwon Bae (ebae@purdue.edu)

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Overview

Indianapolis is aiming to become the Sports technology related HQ in US.

For senior design project ideas:

CONNECTED DEVICES

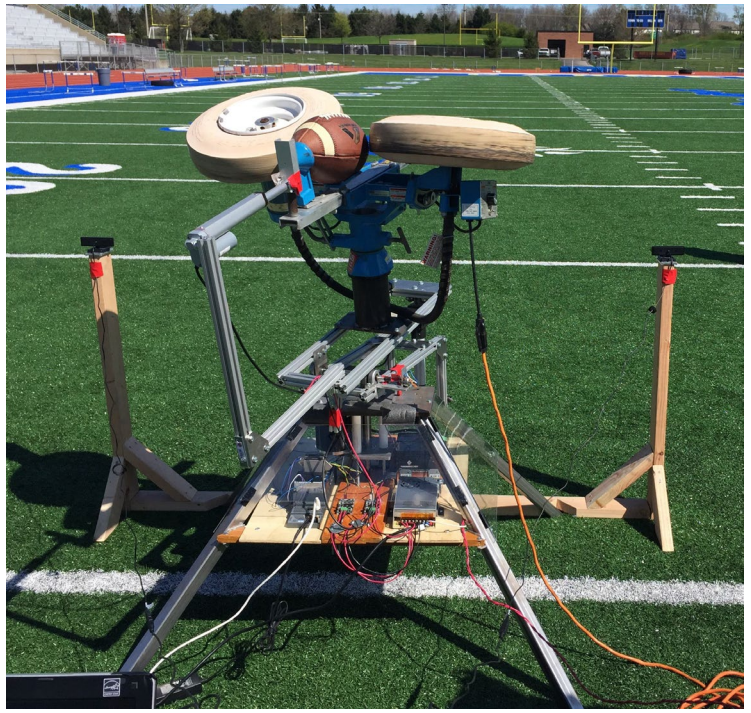
SPORTS DATA ANALYTICS

FITNESS TECH

Examples

Some examples

Cricket swing analytics



Football training robot

Ping-Pong training machine

Contact

Please feel free to reach out to Prof. Euiwon Bae (ebae@purdue.edu) if you have further question or want to discuss the validity of your project idea in sports tech.

RESEARCH-SPONSORED PROJECTS

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RESEARCH-SPONSORED PROJECTS

- **Looking for students who**
  - Had/are having an excellent UG research experience
  - Believe their research faculty would sponsor a project
  - Research group would provide a liaison for the project
  - Research group would help reinforce research practices
- **If you would like to nominate your research group for a Senior Design project, complete the Qualtrics survey by MIDNIGHT February 20th**

  https://purdue.ca1.qualtrics.com/jfe/form/SV_1NRN4nbYflljz7w

Questions? Contact Professor Jensen (jensen23@purdue.edu) or Professor Hirleman hirleman@purdue.edu

Marine Energy Collegiate Competition

POWERING the BLUE ECONOMY™

Marine Energy Collegiate Competition

U.S. DEPARTMENT OF ENERGY

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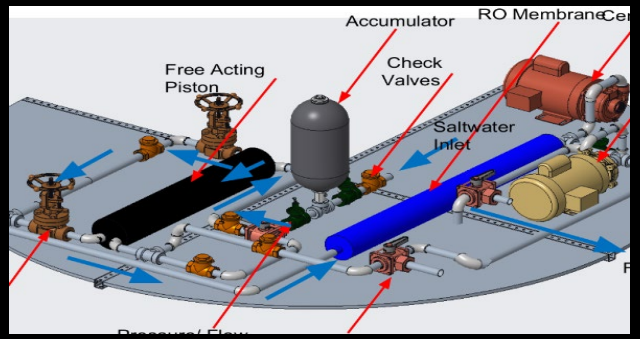
MECC Competition Structure

Business Plan

- **Identify a market in blue economy**
  - Preservation of mari environment
- **Examples**
  - Underwater Vehicle Charging
  - Desalination
  - Offshore Aquaculture
  - Community Microgri

Technical Design

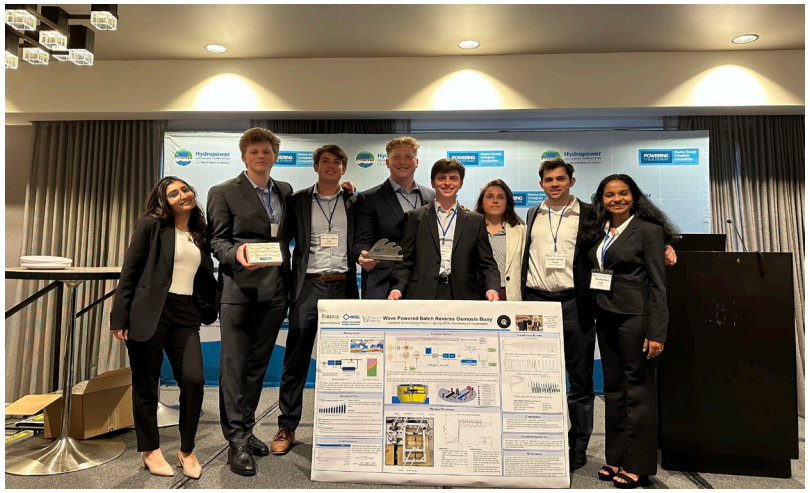
- Brainstorm and develop design for concept
- Marine energy powered device
- Funding: $15,000
  - (Department of Energy)



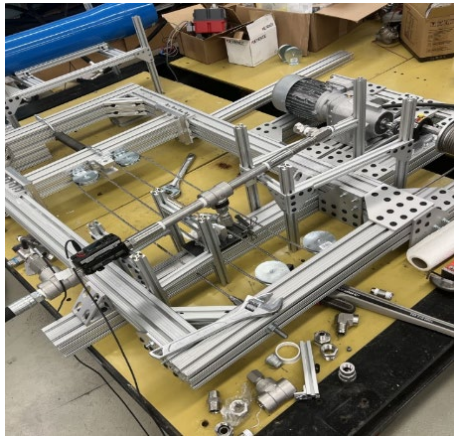
Built/Test/Outreach

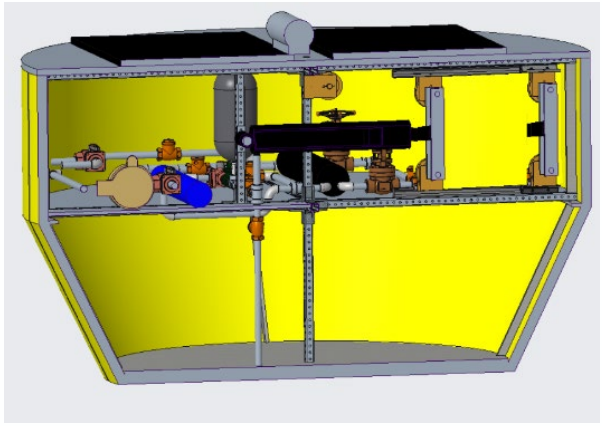
- Built and test completely scale prototype
- Outreach activities to community
- Educate K-12 students about marine energy

2023 MECC Team



- Market: Desalination, Water Scarcity
- Outreach: Waterwheel design competition at WL Intermediate School
- 3rd place Overall at Washington D.C. Waterpower Week Conference (2023)
- 1st place in 2021. 3 journal publications from team efforts, 1/year, so far
- $15k budget, including travel to DC in May after finals





HEAT TRANSFER ON THE INTERNATIONAL SPACE ST

Professor Warsinger

dwarsing@purdue.edu

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PRE-ARRANGED PROJECTS SCHEDULE

Date	Student-initiated projects activities	Industry-sponsored projects activities	Research-sponsored projects activities
2/6/24	**Information Session**		
2/20/24	N/A	**Company contacts DUE**	**Research contacts DUE**
2/27/24	N/A	Companies contacted	Research faculty contacted
3/8/24	**STUDENT Project submission forms DUE**	Initial discussion with company completed	Initial discussion with faculty completed
3/18/24	Project Problem Statements refined/finalized	**INDUSTRY Project submission DUE**	**RESEARCH Project submission DUE**
3/25/24	Finalize list of pre-arranged projects & teams to approve/deny		
3/29/24	**Deadline to send pre-arranged list of student teams to Janeen Redmond**		
4/7/24	Registration instructions sent to pre-approved students		
4/8/24	**Pre-approved overrides deadline**		
4/21/24	**Batch Registration**		

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Hi Dan!

I will need names for pre-approved projects by March 29. This will give me a week to enter overrides and for the students to update their CRF before it closes on April 8.

“FREE AGENTS”

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“FREE AGENTS”

- What if I am not part of a pre-arranged project?
  - You simply register for ME463 as you would any other course.
  - Once the semester begins, your instructor will ask students to submit project ideas and your instructor will use their own methodology for determining projects and teams.

CONTACT INFORMATION

ME 463 Course Web Site:
https://engineering.purdue.edu/ME463/

Student-initiated, Research-sponsored, General questions:
Professor Jensen (jensen23@purdue.edu)
Professor Hirleman (hirleman@purdue.edu)

Industry-sponsored:
Todd Nelson (nelso366@purdue.edu)

This session presentation will be posted on the ME463 website:
https://engineering.purdue.edu/ME463/project_selection

QUESTIONS?