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Capstone Design ME 4182

Studio Session #1: Summer 2023

Date: 05/15/2023

Dr. Amit Jariwala

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Rank order your learning style

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REMINDERS

- ALL Links and Slides are posted here: <http://mecapstone.gatech.edu/students>
- Update your profile on Capstone Marketplace: <https://projects.gatech.edu/>
 - How to guide: <https://mecapstone.gatech.edu/howto>
- Common MS Teams Support Network: <https://mecapstone.gatech.edu/support>

What is Capstone Design all about?

Goals for the course:

1. Identify an unmet need

WHAT'S THE PROBLEM?

2. Invent/design something useful

CREATIVITY, INNOVATION

3. Apply your analytical knowledge to design it

ANALYTICAL SKILLS

4. Prove it will work (Simulate it, build it, test it, virtually, physically)

MODELING AND HANDS-ON

5. Document your process (reports, presentations)

6. Demonstrate it at the Expo

7. Give to sponsor for use or patent it and start company

Course Expectations

- **CAPSTONE** – Synthesize knowledge & skills acquired in UG curriculum
 - Identify & apply relevant topics from **earlier courses**
 - Critically **evaluate** designs
- **DESIGN** – Address broad range of requirements
 - *Identify and specify design **requirements***
 - *Apply **systematic design process** to develop a design from problem to a detailed, proof-of-concept design meeting all of the specifications*
- **PROFESSIONAL EXPERIENCE**
 - *Clearly **communicate/document** design ideas and information*
 - *Work collaboratively and responsibly as a **team***
 - *Demonstrate ability to facilitate own learning by identifying design issues and questions that require additional investigation beyond basic undergraduate curriculum knowledge, then formulating appropriate courses of action.*

Course Deliverables – Submit to your *assigned* team advisor

- Team Deliverables

- Interim Report and oral presentations around week #5
- Final Report, Final Presentation, Fab package during week #11
- Weekly lab deliverables (at the discretion of your assigned team advisor)

- Individual Deliverables

- Class participation
- Individual presentation on behalf of the team
- Peer evaluation. You will also be graded based on how well you provide feedback to others.

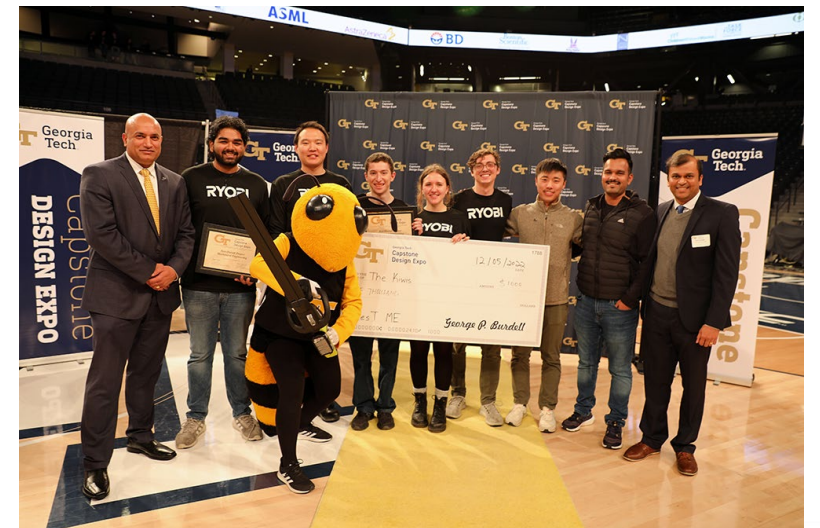
- ***All team members need not receive the same grade!***

- Check with your assigned team advisor for specific grading policies



Georgia Tech Capstone Design Expo

Video from past Expo: <https://youtu.be/G47o7SFTn7o>



List of Past Projects since Summer 2020:
https://capstone.gatech.edu/past_projects

Tuesday, 25th July 4-8pm



Project Prototyping Expense Reimbursement

- EVERY team in ME Capstone design will receive reimbursement from the School and/or the sponsor
- For ME only and ME majority teams, review the process overview here:
<https://mecapstone.gatech.edu/resources/reimbursement-guidelines/>
 - Your team's reimbursement limits will be posted here after week #2: <https://mecapstone.gatech.edu/assignments>
- Only ONE person per team is reimbursed: Assign a Finance Manager within your team
- Receipts must show payment: last 4 digits of CC
- Receipt with ANY personal items will be rejected
- Final Reimbursement Package Due: Friday after the expo

Course Logistics (starting next week)

- **Studios** on Mondays/Wednesdays 5:00 – 6:15pm
 - Studios are scheduled to discuss common materials relevant for the entire class
- **Labs** on Tuesdays/Thursdays 12:30 – 2:25pm in KLAUS #1447
 - Labs are scheduled to work with your team AND discuss your project progress with your team's advisor.
 - Typically, teams meet with their advisor 30-60 minutes per week during this time slot
 - Specific plan (meeting time, date, and activity) MAY VARY based on the Instructor assigned to your team

Common Studio Topics

1. Course Overview, Projects, Teams and Bids, Communication
2. User Needs / Engineering Design Specifications
3. Industrial Design & Human Factors
4. Ideation, Concept Generation, Design Process
5. Market Research and Prior Art
6. Risk, Liability, Codes & Standards
7. Engineering Analysis
8. Social, environmental, and sustainability considerations
9. Prototyping
10. Intellectual Property Protection, Filing Patent Claims
11. Forming a company
12. Communication with the expo judges and the public

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**What is your preference for Studio meetings
(scheduled on M/W 5-6:15pm) going forward?**

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How to form a team?

- Team sizes are 5-6 students per team
- Total 31 ME students as of today

- Find team members
 - Based on project interest or skills and experience on <https://projects.gatech.edu/>
 - Via class-wide chat on MS Teams <https://mecapstone.gatech.edu/support>
 - Self-identified/assembled during lab meeting on May 16 in **Klaus #1447**

The DEADLINE to form groups is 11:59 pm on Tuesday, May 16.

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What % of the class do you believe has created a profile on projects.gatech.edu?

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How to form a team?

We asked AI Chatbot

<https://chat.openai.com>

Projects will be assigned this Thursday morning through an open bidding process



How to form a team for the senior capstone design class?



Forming a team for a senior capstone design class typically involves the following steps:



1. Identify the members of the class who are interested in working on a project together. This can be done through class announcements, online forums, or direct communication with classmates.
2. Assess the skills and experience of each potential team member to determine how they can contribute to the project. This will help ensure that the team has the necessary expertise to complete the project successfully.
3. Create a list of potential project ideas, and discuss them with the potential team members to gauge their interest and expertise in each area.
4. Select a project idea that the team is excited about and that leverages the strengths of each team member.
5. Finalize the team by agreeing on roles, responsibilities, and expectations for each member. It is also important to establish a clear communication plan and schedule for regular team meetings.
6. And finally, keep everyone aligned with the project goals and make sure all the team members are on the same page, and all the work is divided in a way that is fair, clear and manageable for everyone.

Project Types

1. External company sponsored
2. Faculty (**F** prefixed projects)
3. Student idea (**S** prefixed projects)

- For types #1 and #2, check out currently available projects (more are being added) here: <https://projects.gatech.edu/>
- For guidance on how to use the online portal, see this: <http://mecapstone.gatech.edu/howto>
- Examples of past projects are here: https://capstone.gatech.edu/past_projects

NDA and IP

NDA:

- In rare circumstances, a Company's proprietary information must be shared with Georgia Tech, such as with the faculty coordinators and/or Project Team's faculty mentor. In such cases, a confidentiality agreement with the Georgia Institute of Technology (GIT) might have been executed. Student teams working on such projects will be required to accept the GT NDA form (which will be sent after the project is assigned to the team)
- Some projects might only need an NDA between the student team and the company. In such cases, the student team would be required to accept an NDA directly with the company. The students will have to make sure to not disclose any company confidential information to anyone other than their own team (not even their faculty advisor).

IP:

- For the course, students working on the project typically own the resulting IP that they create, and not Georgia Tech. Hence, students (and not GT) can assign any resulting IP to the company.
- Most **sponsors prepare an IP assignment document** for students to accept at the start of the project.

Elements of a Good Student Project

- What's the problem?
 - NOT "We're going to design a better mousetrap"
- Creative/Innovative - not just an assembly of off-the-shelf parts (room for concept exploration and evaluation)
- Lends itself to analysis
- Sufficient scope for senior design
- Team should have or acquire the skills to complete the project.
- Produce a proof-of-concept and learn from it
 - Design revisions
 - Validate design decisions
- Submit your project idea on the marketplace website ASAP
- You can present your project to the class **NOW!**

What is a Good Bid?

CONVINCE us that you are the best group for the project.

- What is your understanding of the project?
 - Why do you want the project?
 - What are your skills, talents, and experiences relevant to the project?
 - Anything else that is relevant
-
- Your team can...
 - Only assign one priority rank per project bid. A rank of “1” means your first choice
 - Submit bids for as many projects as available for your team
 - Your team will be required to work on the project for which a bid was submitted and was awarded by the faculty
 - You are required to submit a bid for your project idea as well
 - Create/Edit/Cancel bids anytime until **8:00pm on Wednesday, 17th May**

What should you include in a bid?

We asked AI Chatbot

<https://chat.openai.com>

Do not present your solution, rather focus on how well you understand the project and why your team is best suited for the project



What things should I include in a bid for a capstone design project?



When submitting a bid for a capstone design project, it is important to include the following key elements: 👍 👎

- ~~1. Project summary: A brief overview of the project, including the problem or challenge being addressed, the proposed solution, and the expected outcome or deliverables.~~
- ~~2. Project scope: A detailed description of the work that will be done, including the specific tasks and milestones that will be completed during the project.~~
3. Team qualifications: An overview of the skills, experience, and qualifications of the team members, including relevant education, work experience, and any relevant certifications.
- ~~4. Timeline: A proposed project schedule, including key milestones, expected completion date, and any critical deadlines.~~
- ~~5. Resources: A list of the resources that will be required for the project, including equipment, software, materials, and any other necessary supplies.~~
- ~~6. Budget: An estimate of the costs associated with the project, including any expenses for materials, equipment, or other resources.~~
- ~~7. Risk assessment: A brief assessment of the risks associated with the project and a plan for mitigating those risks.~~
- ~~8. Sign-off page: A page where team member and mentor sign off on the proposal and are aware of the expected workload and deliverable for the project.~~
- ~~9. Any additional deliverable: Including but not limited to test plan, user manual, technical report, etc. that is requested by the department or the class.~~

It is also important to present the proposal in a clear, professional, and well-organized manner that demonstrates the team's understanding of the project and the resources needed to complete it successfully.

How are teams matched to projects?

- Two avenues
 - Bid for a sponsored project
 - Propose your own project
- Teams are matched to projects and to faculty (see the FAQ [here](#))
- Even if you plan on bidding for sponsored projects, should have a “Plan B (C, and D)” project idea of your own

Barriers to success

- Lack of commitment, initiative and anticipation
- “Is this what you want?” – expecting to be told what to do, rather than acting independently
- Lack of consideration and systematic evaluation of alternatives
- Dithering over alternatives and not selecting a final design
- Lack of questioning assumptions, preconceived notions, etc.
- Team Dysfunction
 - Lack of leadership
 - Lack of a shared and coherent vision
 - Lack of accountability and progress
 - Personality conflicts
 - And on and on...
- Confusion between role of student team, sponsors and faculty

Design your *product*... ... not your *prototype*



Cardboard iPhone Scanner made by designer Kyle A Koch. Credit Image: [Kyle A Koch](#)



A typical Product Development Timeline (<https://blog.bolt.io/ideation>)



Prototyping is a means to an end and not an end in itself!

Past CIOS Comments from Students?

Best Aspect

- *The most I learned was basically more interpersonal skills like teamwork, rather than technical skills. Which both are important*
- *I really enjoyed the feedback and the presentations forced us to step back and evaluate our progress in relation to our goals.*
- *The ability to choose your own project / choose amongst given topics made it possible to learn something new or choose something in which we had knowledge about.*
- *Meetings with the advisor were the most helpful in preparing for course deliverables; in terms of what was the most enjoyable aspect of the course, building a prototype of our product and conducting analyses of it was certainly a very rewarding experience.*

Past CIOS Comments from Students?

Student Effort

- *6-9 hours is probably a fair average of my team's work every week, but it was always concentrated over a few days; 10-12 hours, spread out over 6-7 days, probably would've felt like a much lighter load.*
- *It's capstone, so was expecting it to take up any and all free time*
- *The expected and expended effort was appropriate for the course. I did expect to spend more time in this class compared to others and it was true.*

Past CIOS Comments from Students?

Course Improvements

- *Push for teams to do the analysis as soon as possible during the semester.*
- *The report projects, while helpful, were not always the correct format or required the right information we needed to be focused on at that moment. I believe a more flexible or variable deliverable would help teams. There needs to be something that facilitates their design process, decisions, and documentation while they are working so that there isn't a feeling of stopping progress to write a report.*



How to not get a b in the capstone design class?



Not getting a B in a capstone design class requires effort, dedication and a clear understanding of the class requirements. Here are some steps you can take to avoid getting a B:



1. Understand the class requirements and expectations: Review the syllabus and any other materials provided by the instructor to gain a clear understanding of the class expectations, grading criteria and the requirements for each assignment or project.
2. Set clear and specific goals: Set specific and measurable goals for yourself and your team that align with the class requirements and expectations.
3. Create a schedule: Create a schedule that outlines when you will work on each task or assignment, and stick to it. Make sure to set realistic deadlines for yourself and your team members, and plan for any unexpected challenges.
4. Stay on top of your work: Stay on top of your work by completing assignments on time and keeping up with readings, lectures and feedback from the instructor.
5. Communicate effectively: Communicate effectively with your team members, mentor, and instructor throughout the class. Ask for help when you need it and provide updates on your progress regularly.
6. Seek feedback: Seek feedback from your team members, mentor, and instructor throughout the class, use it to improve and get an idea of where you stand.
7. Show initiative and responsibility: Take initiative on the project and show responsibility for the success of the project. This can help to demonstrate your expertise and ability to lead.
8. Stay engaged: Stay engaged in class and participate in discussions and activities, it shows that you are invested in the class, and you understand the material.
9. Don't procrastinate: Avoid procrastinating and prioritize your work, completing the most important tasks first. This will help ensure that you stay on track and don't fall behind.

By following these steps and putting in the necessary effort, you can work towards avoiding a B in your capstone design class.

Important Dates for Students

- Pre-semester activities:
 - Create a profile on <https://projects.gatech.edu/> and enter skills/experience
 - Introduce yourself on MS Teams for the class at <https://projects.gatech.edu/>
 - Soft deadline to propose your own idea for premium pitch opportunity on <https://projects.gatech.edu/>
- 15th May (First Day/Studio of Class)
 - 5:00pm in KLAUS #1447
 - Course Introduction and Overview
- 16th May (First Lab of Class)
 - 12:30pm in KLAUS #1447
 - Learn about Industry Sponsored Projects
 - Propose your own idea, if any
 - 11:59pm: DEADLINE to form groups and submit your own project idea on <https://projects.gatech.edu/>
- 17th May (Second Studio of Class)
 - 5:00pm in KLAUS #1447
 - Studio lecture on User Needs, Design Specifications, etc.
 - 8:00pm DEADLINE to submit bids for sponsored projects on <https://mecapstone.gatech.edu/marketplace> (you will be required to work on ANY project that your team bids on if it is assigned)
- 18th May (Second Lab of Class)
 - 12:30pm in KLAUS #1447
 - Projects assigned to teams

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What question do you have/had that you wish was more clearly addressed?

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