Introduction to Design Thinking

Fall 2022

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Teaching Assistant (s) Student TA

Time _____

Grade 11-12

Location iHub

Office Hours T/TH/F 3-4 PM or By Appointment iHub

Text Nigel Cross: Design Thinking
Dev Patnaik: Wired to Care
Ecojustice Education

Course Overview Intro to Design Thinking is a student inquiry, team based course designed to elicit experiential and authentic learning for upper level high school students. Students will work among teams to identify problems in our world and design solutions. Main topics include needs finding, screening, concept generation, concept selection, and implementation. A primary deliverable will include a completed Design History File. The result will be a deep understanding of a problem at hand, its stakeholders, and the solution inputs and outputs, ultimately leading to a proof of concept and prototype.

This course was inspired by Project Invent, Columbia University - Biomedical Design, IDEO, and d.school Institute of Design at Stanford University

Course Objectives

- Design a ***product*** in an identified industry
- Understand the fluid process of ***design thinking*** and its components
    - Process: From ***defining a problem*** to ***idea generation*** and ***implementation***
- Development of Design History File and Business Plan
    - Technology description, Value Proposition
        - Mock Investor Pitch
- Communication/Collaboration Skills
    - Presentations

        - Progress Reports
        - Group Meetings

Grading

- Quarter 1 Presentation 20%
- Quarter 2 Presentation 25%
- Design History File 20%
- Assignments 35%
    - Participation/Preparation
    - Progress Reports

*Progress oriented grading
**Scaled by Peer/Instructor Evaluation

Participation:

- Class Involvement 5%
- Project Highlights 5%

Preparation:

- At home Videos/Quizzes/Action Items 10%

Progress:

- Progress Report 10%
- Design History File Updates 5%

Project Highlight:

- 5 minute introduction and discussion of new technology with problem definition and need statement (Includes 1 PowerPoint Slide)

Progress Report:

- Prior to scheduled meeting, submitted progress report
    - 1-2 page outline:
        - What was covered in the prior meeting?
        - What was done? Any key findings?
        - What is next?
- ~30 minute review of progress with instructor and individualized guidance (Scheduled Before/After School outside of class time)

Peer/Instructor Evaluation

- Midpoint and End of Semester using CATME

Design History File

A. This documentation is designed to organize and present information relating to the problem and determined solution. This will be the overarching deliverable that student groups will be required to submit. Some groups may have more information or be further along the process than others. Grading is based on progression.
B. Consists of the following:
    a. ***Problem Definition and Need Statement***
        i. Overview
        ii. Identify Need
    b. ***Research***
        i. Fundamentals of the background (ie. Disease State information)
        ii. Existing Solutions
        iii. Gap Analysis of Existing Solutions
        iv. Intellectual Property/Prior Art Landscape
        v. Stakeholder Analysis
        vi. Expert/User Interviews
        vii. Market Analysis
    c. ***Idea Generation***
        i. Inputs (Functional Requirements)
        ii. Constraints
        iii. Any Technical Specifications
        iv. Solution Generation - List of Ideas with images
        v. Decision Matrix
        vi. Proof of Concept Testing
            1. Goals
            2. Materials
            3. Procedure
            4. Results/Discussion
            5. Conclusion
    d. ***Future Directions***
    e. ***References***

Topic Breakdown

- Design Thinking Overview
    - Design Sprints and Problem Exploration
    - “Human” Centered approach
- Technical Skills
    - Laser Cutting
    - CAD Design and 3D Printing
    - Arduino (Electronics and Programming)
- Empathizing and Needs Finding
    - Research
        - Interview / Experience
            - Focus on *Values*
        - Prior Art Landscape and Intel. Property

        - Market Analysis
            - ***Problem Definition & Need Statement***
- <u>Idea Generation</u>
    - Solution addressing the need
        - Solution Exploration
        - Design Inputs Vs Outputs
- <u>Idea Selection</u>
    - Prototyping
    - Design History File
    - Refine
    - Proof Of Concept/Implementation
- <u>Pitching</u>
    - Present culminating project to panel and peers
    - First presentation covers the problem and market analysis
    - Second presentation covers the culmination of work. Not all groups will be completely finished. This will simulate an investor pitch.

Advisors:

- Groups will identify advisors in the industry area
    - This may be another teacher in the building and/or and industry professional
- Groups will have ongoing assistance from students in the other design class (Occasional joint classes, out of class support)

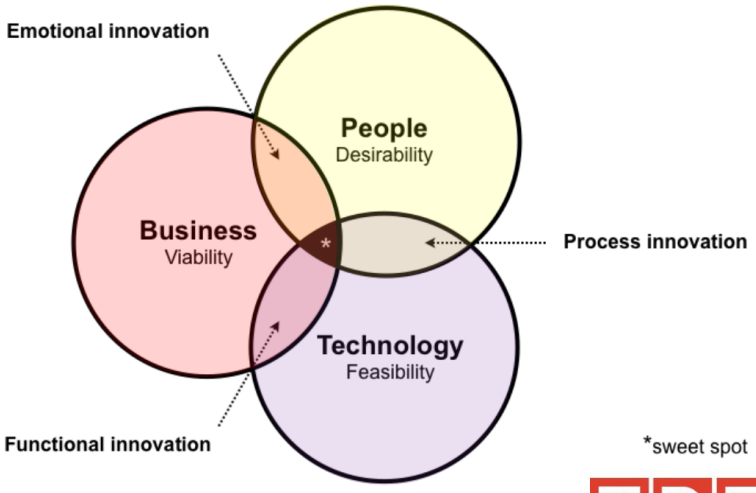
Remember:

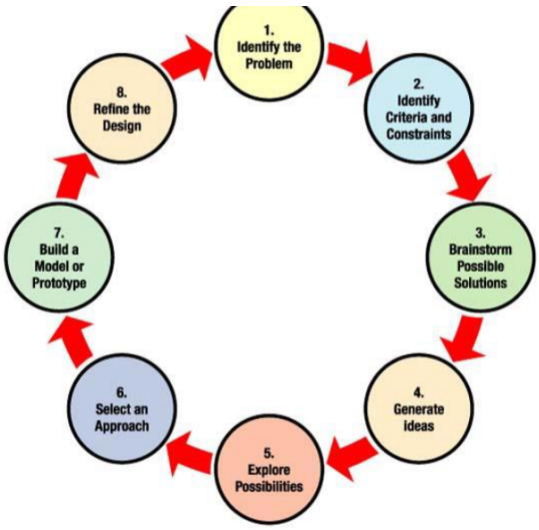
- *Stay Positive*
- *Collaborate with each other*
- *Know your responsibilities*
- *“Fail Early, Fail Often”*
- *Respect for an inclusive environment*

Month	Topics	Assignments
September (IDENTIFY)	- Intro to Design Thinking - Warm - Up Design Sprint Activities (Team-Building) - Need Finding/Problem Definition - Design Sprint #1 - Customer Discovery - Design Sprint #2 - Empathize, Define, Ideate, Prototype, Test, Reflect *Technical Skill: Laser Cutting & CAD*	-Problem and Need Statement (With Pitch) -5 Interviews/Observations

October
(IDENTIFY/CONCEPTUALIZE)
	- Identify the Need
	  - Research issue, What solutions exist?(IP and Prior Art Landscape)
	  - Stakeholders/Market Analysis
	- Idea Generation
	  - Design Inputs
	  - Brainstorming
	  - Prototyping
	
	Technical Skill: 3D Printing
		Progress Report - Needs:
		- Problem and Need Statement: Combined and Revised (2-3 problems)
		-5 Interviews/Observations
		
		-DHF Update 1
		
		Progress Report - Concept Generation:
		-Inputs and ideation

November (CONCEPTUALIZE)	- Design Sprint #3 - Idea Selection and Prototyping - Peer to Peer “Consulting” *Technical Skill: Arduino*	-Peer Evaluation -DHF Update 2 Progress Report - Concept Selection: - Concept Map
December (CONCEPTUALIZE/IMPLEMENT)	- Proof of Concept - Value proposition/Competitive Advantage - Business Model - IP *Technical Skill: Website Development*	Progress Report - PoC: -Prototyping
January (IMPLEMENT)	- Investor Pitch	-Peer Evaluation -DHF Final -Pitch Night





Notes:

- IP Policy
- Student Privacy & Safety with professional contacts
- Advisor participation
- Student Budget - $500 with justification - approval by instructor