EST 205 - Introduction to Technological Design

Time: Mondays and Wednesdays, Frey 305, West Campus

Instructor Contact: Professor Komal Magsi – komal.magsi@stonybrook.edu

This course introduces undergraduate students to technological design through the understanding of global issues including (but not limited to) malnutrition, water scarcity and purity, sustainable development, climate change and safety for women and girls. Design is treated, as an iterative universal human activity comprised of learnable principles, processes and skills. Specific topic areas include: creativity and innovation in design, human need - finding and problem identification, empathization of user needs, design specifications, using research on design processes, design concept generation and development, prototyping tools using 2D and 3D models, user testing, and redefining the problem statement.
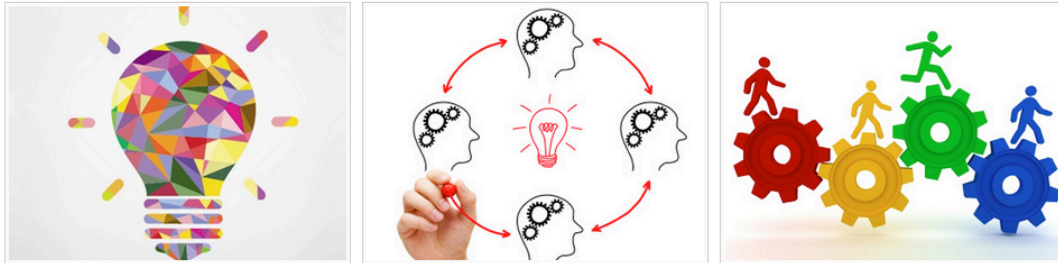
Unlike analytical thinking, design thinking is a process that includes the "building up" of ideas, *with few, or no limits on breadth during a "brainstorming" phase*. This helps reduce fear of failure in the inventor/participants and encourages input and participation from a wide variety of sources in the ideation phases.

The design thinking process in this course begins with a deep understanding of our customers- either individuals living in impoverished communities or individuals who are suffering from one or more of the millenium development challenges. This human-centered methodology, coupled with a "fail fast" attitude, allows students to quikcly **identify, protype and conduct user testing.**

By implementing "Design Thinking" - we spend less time planning, more time doing, and, above all else, challenging ourselves to see the world through the eyes of **our users**.

Design Question for Final Project: Engineers have a collective responsibility to improve the lives of people around the world. The world is becoming a place in which the human population (which now numbers more than 7 billion) is becoming more crowded, more consuming, more polluting and more connected. The question now arises whether it is possible to satisfy the needs of a population that is growing exponentially while preserving the carrying capacity of our ecosystems and biological and cultural diversity. **A related question is what should be done now and in the near future to ensure that the basic needs for water, sanitation, transportation, energy, nutrition, proper waste handling, health, safety, and meaningful work are fulfilled for all humans. Using design principles taught in this class, students address these issues in their final capstone projects.**

In the simplest sense, design thinking is a *space* of
<u>overlapping</u> *spaces* (as described by IDEO):

INSPIRATION → IDEATION → IMPLEMENTATION

January 27th – Design Thinking Process and IDEO - 1

Feb 1st – Design Concept Generation and Development - 2

Feb 3rd –Design Concept Generation and Development – 3

Feb 8th – Human Need – Finding and Problem Identification - 4

Feb 10th – Sustaining Design Revolutionaries: Global Water Scarcity Issue - 5

Feb 15th –Maxwells Equations and Fair Trade Mobile Phones - 6

Feb 17th – Breaking down the conceptual designs of the "Greatest Ideas" – Defining "Interruption" – 7

Feb 22nd – Dynamics of Technological Design: Creating "Interruption" – 8

Feb 24th – Industrial Implications for Sustainable Devices: 3D Printing & Solar Cells – 9

Feb 29th – Industrial Implications for Sustainable Devices: Wind Turbines and Bio Fuel - 10

March 2nd – Interdisiplinary Problem Challenges –Viscosity and a construction worker – 11

March 7th – Evaluating Past Design Failures for Future Design Success – 12

March 9th – Leveraging Human Centered Prototyping and Empathy, Deep Frame - 13

March 14th – Spring Break

March 16th – Spring Break

March 21st - The Typology of Planning, Change by Design – 14

March 23rd - Visual Design – Design Thinking - 15

March 28th – Interviews – 16

March 30th – Design Thinkers Personality Profile – 17

April 4th – Patents and Intellectual Property – 18

April 6th – Patents and Intellectual Property – 19 Part 1

April 11th - Value of Visual Design/Prototype in Pitching Your Idea -19 Part 2

April 13th – Technologies For Creative Learning -20

April 18th – 3D Printing -21

April 20th – 3D Visualization & HCI/BCI (HUMAN COMPUTER INTERACTION) - 22

April 25th – Systems Thinking Introduction, Technology for Sustainable Development- 23

April 27th – Project Meeting Pitches - 24

May 2nd – Final Presentations

May 4th – Final Presentations

Grading Assessment

Assignments/Quizzes and Course Participation/Attendance – 50%

Final Project – 50%

Brief Note on Final Projects (Extensive Discussion in Class)

Design a technical solution for a specific location using empathetic technological design.

Research on the region, providing specific statistics on KEY issues in the area.
Your problem statement arose as a result of the **issues and needs** you became aware of for the community you are focusing on. I must approve your problem statement.

Components:

1. Visual Component
- Power point of your issue, user, and iterative design process/solution
- 1 Page Design Evolution Sheet

2. Prototype
Physical Prototype Showcasing Design

3. Final Pitch in front of judges at Long Island High Technology Incubator

Final Pitch – 20%
Visual Component – 40%
Prototype – 40%

Homework

You will have a reading or design assignment every week, with the exception of when we begin your final capstone projects for the course. I expect to receive your assignments on time through blackboard, unless otherwise instructed. **Late assignments are not accepted.**

Blackboard

Students are required to check Blackboard before each class for course information, and occasional short assignments. Please be sure that your email address is in the Blackboard system so that you can receive class mailings. Blackboard can be accessed at the following site: http://blackboard.stonybrook.edu/ If you used Blackboard during the last semester, your login information (Username and Password) has not changed. If you have never used Stony Brook's Blackboard system, your initial password is your SOLAR ID# and your username is the same as your Stony Brook (Sparky) username, which is generally your first initial and the first 7 letters of your last name. For help or more information see: http://www.sinc.sunysb.edu/helpdesk/docs/blackboard/bbstudent.php For problems logging in, go to the helpdesk in the Main Library SINC Site or the Union SINC Site, you can also call: 631-632-9602 or e-mail: helpme@ic.sunysb.edu. Assignments, lectures, data sets, and power point presentations will usually be available at the site. Also, check for messages regarding class news such as possible snow days or other last minute changes or cancellations.

Academic Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report and suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at: http://www.stonybrook.edu/uaa/academicjudiciary/ .Be warned that

the university provides plagiarism-detecting software to its instructors. Any suspicious work will be run through this software.

Americans with Disabilities Act

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room-128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information, go to the following web site: http://www.ehs.sunysb.edu. Search Fire safety and Evacuation and Disabilities.

Incompletes, Extensions and Make-Up Exams

There will be absolutely no make-up exams. I will neither grant incompletes in thecourse, nor will I grant extensions on the projects and exams, except in cases ofemergency or where university policy applies. Doctor's notes are expected for medical excuses, and confirmation from a funeral parlor is required for a death-in-the family absence. If you miss an exam or the project deadline without a valid excuse, you will receive a zero.