

EAS 310: Global Design Engineering Innovation

College of Engineering & Applied Sciences
TBI Global Engineering Summer Field School
Ileret, Kenya, Summer, 2017



Instructor Information

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Course Description

This field course at Turkana Basin would expose students to apply the design thinking and mission-centric Lean LaunchPad methodology for discovering both the technical problems and the customers for the local community at the Turkana Basin. The students will identify such problems in the proper socio-economic and cultural context by deep observation and engagement with the local community by taking an empathy-oriented approach. They will be led to follow the engineering design cycle of need identification, generation of problem statement, product design specifications and criteria to creation, evaluation, and selection of conceptual designs. Examples of the problems could include activities of daily living (ADL), resource generation and conservation, and disability assistance. The multi-disciplinary, and -year students working in groups will collaboratively identify and define the problems and propose ethical, socially-responsible, and innovative solutions that maximize the value proposition of the innovation.

Prerequisite: WRT 102, one SNW course, one QPS course, permission of the instructor

SBC: SPK, GLO, TECH, Partially fulfills: EXP+ and ESI (with EAS 312)

Course Purpose

This Design Innovation field class is one of the two classes that constitute the Turkana Basin Institute (TBI) Engineering Summer Field School. The Turkana Basin has one of the world's most productive and spectacular records of early hominin evolution and the TBI participates in ongoing paleoanthropology research focusing on the last 4 million years. This class would provide a structure for students from diverse disciplines and academic standing to come together to work on identifying and solving practical problems with extreme constraints at TBI and in the surrounding community. The field work in this class would prepare students to apply knowledge, skills, and foresight to creating resource-aware, simple solutions to problems and building a community where the formal boundaries between teacher and the student are removed leading to rich and meaningful experiences. Studies have shown that such field experiences and peripatetic pedagogical model infused with significant experiential learning activities can be formative and inspire students to be innovative, creative, and entrepreneurial.

Course Learning Outcomes (CLO)

Upon completion of this course, students will be able to:

- CLO 1. Apply the Design Thinking model to demonstrate the fundamental concept of understanding the customer's needs and wants
- CLO 2. Identify and formulate an engineering problem that addresses a hypothesized prospective customer pain or need with real-word constraints and maximum value proposition using Lean LaunchPad model canvas.
- CLO 3. Prepare problem statement reports. Deliver a proficient oral presentation and evaluate oral presentations of others per specific criteria.
- CLO 4. Understand how engineering solutions can have impact on the society and people's lives.
- CLO 5. Generate and evaluate conceptual designs according to Product Design Specifications,

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reflecting the results of value proposition and customer segment hypothesis testing.
CLO 6. Develop an ability to function on multidisciplinary and multi-yearly teams

Course Topics

- 1) Design Thinking Basics and Case Studies
- 2) Lean LaunchPad Business Model Canvas
- 3) Conducting Field research: tools for engagement, techniques for interviewing and generating data
- 3) Identification of Problems and Multiple Realistic Constraints
- 4) Development of Product Design Specifications
- 5) Conceptual Design Generation
- 6) Writing technical reports and making Oral Presentations

Class Meetings: Monday - Saturday, 9:00 am - 12:00 pm, and 2:30 - 5:30 pm (when not on field)

Note: for Contact Hour calculation 'Lab' is considered as requiring outside preparation time and given a 2/1 ratio, while 'Field' is considered as not requiring outside preparation time and given a 3/1 ratio.

Week	Day	Lecture	Lab	Field	Other	Total
1	1	6	2			8
1	2			8		8
1	3	6	2			8
1	4			8		8
1	5	3				3
1	6	4	4			8
2	7			8		8
2	8	4	4			8
2	9			8		8
2	10			8		8
2	11			8		8
2	12		6		2	8
Total Hour		23	18	48		91
Contact Hours		23	9	16		48

Textbook

No textbook is required, however, reading would be assigned by the instructor through the blackboard site.

Reference book: Stuart Pugh, Total Design — Integrated Methods for Successful Product Design, Addison Wesley, 1991.

Total Design/Design Thinking Handout

Stanford D-School Crash Course on Design Thinking: <http://dschool.stanford.edu/dgift/>

How to Build a Startup using Lean LaunchPad Methodology: <https://www.udacity.com/course/how-to-build-a-startup--ep245>

Grading

Each team has 100 points. A(100-94), A-(93-90), B+(89-87), B(86-82), B-(81-79), C+(78-76),

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C(75-72), C-(71-68), D+(67-64), D(63-60), F(59 or below). The following is the breakdown:

- 1) Multi-Disciplinary Discussions 20% -- students are expected to actively participate in the class discussions, field interviews and data collection
- 2) Lab exercises 20% -- lab or practical assignments must be completed and handed in
- 3) Two Oral Presentations 20% - students are expected to make at least two oral presentations on the progress
- 4) Final Report 40 %

Communication

You must have an active Stony Brook University e-mail account and access to the Internet. All instructor correspondence will be sent to your SBU e-mail account. Please plan on checking your SBU email account regularly for course related messages. To log in to Stony Brook Google Mail, go to <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password.

This course uses Bb for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. The Bb Course Site can be accessed at <https://blackboard.stonybrook.edu>

Academic Policies

Academic Integrity Statement: 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 any 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/>

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

University Student Conduct Code can be found at (check for most current version) <http://studentaffairs.stonybrook.edu/ucs/docs/universitystudentconductcode.pdf>

ADA & Disability Support Services (DSS) Statement: The Rehabilitation Act of 1973 – Section 504 applies to all postsecondary educational programs that receive federal assistance. Reasonable accommodations and academic assistance are provided to students with disabilities registered with the Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>

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Syllabus Disclaimer

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The instructor views the course syllabus as an educational understanding between the instructor and students. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes via email or in the course site Announcements. Please remember to check your SBU email and the course site Announcements often.