

STS 325: Special Topics Course: Interdisciplinary Research, Design and Innovation

Course Information

Course description: This course provides undergraduate students an overview of research, design and innovation roadmap in a studio-based interactive environment to work on a detailed framework comprising of exploration of problems with potential technology and socio-economic impact. After exploring and examining interdisciplinary problems, students will develop a proposal on the innovation and implementation of the respective research/design toward developing a prototype and business strategy with market research.

Course credit: 3-0-3

Prerequisite: By permission, or Junior level standing with anyone of STS 201, EPS 202 and ECON 201 or their equivalents, all with a grade of C or better.

Policy: Academic Integrity

Academic Honor Code: Each student is required to sign the Honor Code Agreement. The URL for University Code on Academic Integrity: <http://integrity.njit.edu/>

Recommended Texts

- Tom Kelley and J. Littman. *The Ten Faces of Innovation: IDEO's strategies for beating the devil's advocate and driving creativity throughout your organization*. Doubleday, 2005.
- Peter Drucker. *Innovation and Entrepreneurship*, (any edition, various years).
- <http://www.engineeringchallenges.org/cms/8996/9221.aspx>
- <http://www.whitehouse.gov/blog/2010/02/04/grand-challenges-21st-century>

Course Objectives and Outcomes

- Research-Based Inquiry: Students will learn how to apply research inquiry methods to understand challenges in the society
- Engagement: Students will learn how to brainstorm, research and innovate
- Collaboration: Students will learn how to build a team and collaborative to create a goal-oriented synergy
- Innovation Skills: Students will relate creative thinking and innovation to technology research, design and product development
- Research and Innovation: Students will develop an innovative technology product, service or design proposal towards a market need with potential societal impact
- Communications and Networking: Students will improve communication and networking skills, and learn how to make business presentations

Grading Profile

10	In-class participation and discussions
25	Case studies and short assignments
20	Product/Technical Proposal, all stages
20	Business Plan, all stages
10	Mid-Term presentation
10	Final Presentation
5	ePortfolio

100%

WEEKLY COURSE SCHEDULE			
Date	Topics	In Class	Weekly Reading and Assignments Due
Week 1	Introduction and Course Overview	<ul style="list-style-type: none"> - Introduction to Technology Innovation and Challenges in Global Society - Needs for Research and Innovation - Establish Teams 	Reading Assignment on Global Challenges and Societal Needs
Week 2	Research-Based Inquiry	<p>Introduction to Research inquiry methods and search technology/literature review</p> <ul style="list-style-type: none"> - Teamwork: Brainstorming on technology needs, challenges and market needs 	Reading Assignment on Innovator Roles
Week 3	The 10 Faces of Innovation	<ul style="list-style-type: none"> - Innovation Lecture - Short Assignment Overview - Teamwork: Applying the Innovator Roles 	Reading Assignment on excerpts from Kelley's 10 Innovators
Week 4	Innovation Ideas	<ul style="list-style-type: none"> - Innovation Lecture (Cont.) - Teamwork: Innovation Ideas and Brainstorming - Discussion of Assigned Readings and Individual Assignment on Global Challenges and Potential Solutions 	Assigned Reading for today: Grand Challenges in Engineering and Technology: See the website in the recommended text area
Week 5	Identifying Social Needs and Problem Areas	<ul style="list-style-type: none"> - Technology Need Assessment - Discussion of Assigned Readings - Teamwork: Research for Short Assignment on Innovative Ideas 	Short Assignment-1 on Potential Innovative ideas and need assessment
Week 6	Communicating Solutions and Collaborations; Student Discussions on Innovative Solutions	<ul style="list-style-type: none"> - Discussion on Project Ideas and Innovation - Teamwork: Writing and Revising for Short Assignment 	Revision on Short-Assignment-Stage-2

WEEKLY COURSE SCHEDULE Continued			
Date	Topics	In Class	Weekly Reading and Assignments Due
Week 7	Methods on Market Need Assessment	<ul style="list-style-type: none"> - Market Research and Need Assessment Tools - Discussion: Project Ideas and Market Surveys 	Short Assignment-2 on Market Research and Value Proposition
Week 8	In-Class Discussion and Peer Evaluation	<ul style="list-style-type: none"> - Class Presentations of Short Assignment-2 - Peer Evaluation 	Discussion on Final Team Innovation Idea and Market Assessment for Research, Design and Innovation Project
Week 9	Mid-Semester Assessment Innovation Workshop	<ul style="list-style-type: none"> - Presentation of Short Assignments - Consultation + Critique by External and Faculty Advisors 	Faculty and External Advisory Board Workshop Presentations
Week 10	Research and Design Challenges	<ul style="list-style-type: none"> -Research and Design Methods for Prototype Development -Project Discussions 	Short Assignment on Research and Design Methods for the Project
Week 11	Prototype Evaluation and Feasibility Criterion	<ul style="list-style-type: none"> - Evaluation and Validation methods - Hypothesis validation - Statistical validation tests 	Discussion on Demonstration of Feasibility for Research, Design and Innovation Project
Week 12	Professional Ethics, Core Values, Teamwork and Shared Vision	<ul style="list-style-type: none"> - Teamwork and Leadership - Professional Ethics and Core Values - Shared Vision and Collaboration 	Short Assignment on Business formation
Week 13	Entrepreneurship	<ul style="list-style-type: none"> - Innovation to Entrepreneurship Milestones 	Discussion on Research, Design and Innovation Project
Week 14	In-Class Discussions and Peer Evaluation	<ul style="list-style-type: none"> - In-class Group Presentations 	Final Research, Design and Innovation Project Proposal Assignment
Week 15	Final Project (Research, Design and Innovation) Presentation	<ul style="list-style-type: none"> - ePortfolio - Final Complete Project Presentations 	Faculty and External Advisory Board Workshop

Course Curriculum Assessment and Development Protocol

1. The course will follow the NJIT course and program assessment protocol as presented on the NJIT assessment website <http://www.njit.edu/irp/assessment/> and copied below in Figure 1.

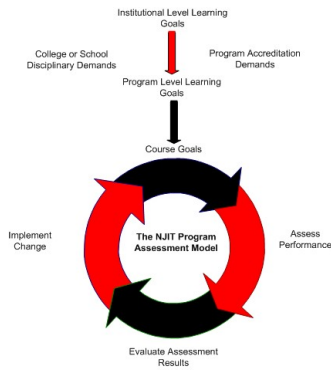


Figure 1. NJIT Program Assessment Model.

2. For course assessment, continuous improvement and closing the loop, an Interdisciplinary Research, Design and Innovation Course Assessment and Development committee will be formed with the faculty representation from NCE, CCS, CSLA, STS, SOM, and CoAD, and the instructor. This committee will review course material, student assignments and e_portfolio to ensure that all competencies of STS/GUR are well met. The committee will also advise any changes in the curriculum based on review and feedback from students, mentors and advisors.
3. An Interdisciplinary Research, Design and Innovation Program Faculty Advisory Board with representatives from all colleges and research centres will be formed to advise and engage students with research and innovation projects through summer research, REU, training grants, and other related UG research programs and opportunities.
4. An Interdisciplinary Research, Design and Innovation Program External Advisory Board with industry experts, entrepreneurs, and angel investors will be developed to mentor UG students on project assessment, market research, product development and innovation management.
5. Students through brainstorming and interactive session would presents research project ideas and proposals to mid-term and semester-end workshops in front of Faculty Advisory Board and External Advisory Board members.