The Design and Fabrication of Everyday Things

Course Credits: 4
Semester: Summer II
Class Meeting Hours: (TBD)
Location: (TBD)
Instructor: Leon Lu (leon.lu@nyu.edu)
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Office hours: By Appointment via email

Instructor: Leon is a designer, researcher and educator who works at the intersection of design, technology and making. He holds a Bachelors of Science in Chemistry from Delhi University in India and a Masters of Design from OCAD University in Toronto, Canada. His work explores the impact of technology on human behaviour through tangible real world interactions using design research methods to create behavioural change. He has also worked with Fortune 500 companies as he spent his early career in advertising at Wieden+Kennedy, New Delhi.

He is currently a Resident Research Fellow at the Interactive Media Arts program at New York University, Shanghai.

Course Description: This course explores the fundamental processes involved in the design and fabrication of everyday objects. Students are introduced to creative techniques to develop insight into human behaviour and explore the idea of human needs. In parallel, they will learn how to make prototypes that begin with rapid paper prototyping techniques and later develops into tangible 3D models of objects using 3D modelling, 3D printing and laser cutting techniques. We will be using Rhino(3D) as our primary CAD software for 3D modelling, Adobe Illustrator to generate laser cutting files and Cura as our primary software to 3D print objects. This class will be partially lecture based and partially studio lead.

This course is offered as part of Program on Creativity + Innovation (PCI) and the Interactive Media Arts (IMA) program. The overall goal of this course is to help students be an active part of the design process. Through use cases, design critique and in class workshops, students will build a fundamental understanding of design and through in-class tutorials, live demonstrations and access to digital fabrication tools, students will be able to realise their ideas into tangible, tactile objects based on insight and research.
Schedule:

Week 1: The first week of the class will be dedicated to exploring the idea of Human Centered Design. We begin by learning to frame a design problem using a Double Diamond Design Process. We introduce students to the idea of Semiotics and Heuristics as well as ask students to conduct a Cultural Probe during the week where they make observations of their surroundings and learn to identify the use and shortcomings of objects in their daily lives.

Week 2: This week will be focused on condensing the information gathered during the first week into meaningful insights. Students will be introduced to rapid prototyping techniques and bodystorming exercises as a means of visualising their ideas into tangible objects. We will also introduce 2D modelling techniques using Adobe Illustrator. Students will learn to use the laser cutter to make objects from cardboard, paper and other easily available materials.

Week 3: This week will be focused on learning to use Rhino 3D which is a CAD (Computer Aided Design) software. Students will learn about the basic interface of the software as well as how to make 3D objects from solids and surfaces. We introduce students to the idea of Affordances and Constraints as well as Human needs and its' relation to how people navigate the world.

Week 4: This week will be focused on taking the 3D models made in the previous week and learning to 3D print them using additive method of our 3D printers. Students will be given hands on training to use a 3D printer as well as learn to use Cura (which is the 3D printing software easily accessible and open source). We will also discuss the Ergonomics of everyday things and help explore a user journey for the objects that we have designed and 3D fabricated.

Week 5: This week will be focused on building more complicated 3D models using Rhino 3D as well as talking about Action Cycles, Mental Models and the building on the idea of Needs and Motivations of users related to the objects that we have designed. We will also ask students to make a second 3D printed prototype of their objects based on the feedback and knowledge gained this week.

Week 6: The final week of this class will be dedicated to evaluating the ideas and fabricated models made by the students using design research techniques such as ABA testing, Design Probes and Usability Testing. Students will also present their final fabricated objects along with research into what design choices were made and a user journey for its’ use as part of their final project.
Reading List:

Week 1:
- User-Centered Design
- Sanders Evolving Map
- Wicked Problems
- Roy Rosin, Reframing Problems (Video)

Week 2:
- The Signs of our times: Semiotics (Video)
- Rapid Prototyping: Google Glass (Video)
- A Strategist’s guide to Digital Fabrication
- Interactive Fabrication

Week 3:
- Jane Fulton Suri, Thoughtless acts
- Affordances and Constraints, Don Norman
- Maslow’s Pyramid
- Max Neef Human Needs Model
- Supporting Effective Product Development

Week 4:
- Empathy Tools
- Outdoor Seating Design to Facilitate Social Interaction Among Older Adults
- Enchanted Objects (Video)
- Human Factors Gets Cooking

Week 5:
- Time Well Spent (Video)
- Accessible Health Care: More Than Just Getting Through the Door

Learning Outcomes:
- Be more familiar with the overall design process.
- Learn to conduct and participate in design research.
- Think critically and generate creative ideas based on user insight.
- Experiment with rapid prototyping techniques.
- Become familiar with 2D and 3D modelling techniques.
- Learn to use a 3D printer and gain experience using a laser cutting.
Course Prerequisites: None

Assessment:
30% Final Project (Presentation, Documentation, 3D Model and 3D Print)
20% Weekly Assignments (Blog posts + Reading Responses)
25% Work In Progress Report (Research, Insight, Process Documentation, Early Prototypes)
15% Creative Technique/Use Case Presentation
10% Participation and Attendance

Grading Evaluation Scale: NYU Shanghai follows the same grading practices as NYU New York. The following grades may be awarded: A, A-, B+, B, B-, C+, C, C-, D+, D, F. In general, A indicates excellent work, B indicates good work, C indicates satisfactory work, and D indicates passable work and is the lowest passing grade. F indicates failure. There are some additional grades—P for pass, W for Withdrawal—which are awarded administratively.

Attendance Policy: Students are expected to attend all scheduled classes unless the instructor explicitly informs the class that other ways of doing the work are acceptable. The action to be taken in regard to tardiness, absence from class or making up late work is the responsibility of the individual instructor.

No student shall leave a scheduled exercise because of the absence of the instructor until a reasonable time has passed. By tradition and as a matter of courtesy, a student should wait ten minutes before leaving.

All classes will be held at their scheduled hour on days immediately before and after all holidays and recesses. Please note legislative days in the fall and spring terms when a special schedule is adopted to accommodate local holidays.

Students, either as individuals or as members of student organizations are permitted to be absent from classes to participate in competitions, conferences, and presentations, either at home or out of town, as approved by the Assistant Dean for Academic Affairs provided the following conditions are met:

- All work missed must be made up to the satisfaction of the instructor(s) concerned;
- No trip shall involve an absence of more than two days, excluding days when classes are not scheduled;
- The total number of days of absence shall not exceed six per sport or per organization annually;
- Each student will obtain an absence authorization signed by the Assistant Dean for Academic Affairs. The student will present this authorization to the instructor before the date in question. This is not an excuse for work missed.
• Making up exams: A common practice for approved absences is to have the student's teacher or supervisor proctor exams or quizzes during travel to a contest.

University Policy on Make-up of Absence from Class due to illness: When students are ill, they are expected to notify professors in advance of class, if at all possible. Students should negotiate with professors the time and place for make-up of assignments, tests and/or examinations missed. In cases where students are seriously ill and will miss more than a week of classes, the Office of Health and Wellness should be contacted so that the student's other professors may be contacted. The Office off Health and Wellness will not verify medical absences of under a week.

Extra Course Activities or Class Sessions: Undergraduate students often have many commitments, including other classes and work. University policy is that faculty may not require undergraduates to attend a particular event outside class hours. If faculty want to ask students to attend a special event or exercise outside of the regular class hours, then faculty must make it either optional or provide several times.

Students with Disabilities: NYU is committed to providing equal educational opportunity and participation for students with disabilities. It is NYU Shanghai’s policy that no student with a qualified disability be excluded from participating in any NYU Shanghai program or activity, denied the benefits of any NYU Shanghai program or activity, or otherwise subjected to discrimination with regard to any NYU Shanghai program or activity. Any student who needs a reasonable accommodation based on a qualified disability is required to register with the CSD for assistance. Students can register online through the Moses Center and can contact the Director of the Academic Resource Center, Cydney Delia (cydney.delia@nyu.edu) with questions or for assistance.

Academic Conduct Policy: Many of the students at NYU Shanghai come from educational backgrounds that may not recognize actions that the University community considers cheating as violations of academic integrity. Since we are committed to upholding the same academic standards in Shanghai as in New York, it is imperative that you educate students as to your expectations involving group work, paper writing, and test taking. Making your standards clear for each assignment and test will be sufficient for most students. In addition, please take precautions to prevent breaking academic conduct in your classes, particularly in major assignment and examinations. Refer to this link for more information on Academic Standards and Discipline.

You may wish to use as many proctors as needed. You should also attend your own examinations, as is University practice. It is extremely important that our students understand how important academic integrity is to this institution. If you discover that a student has not followed academic integrity, the procedures to follow are:

1. Try to be as precise as you can about what you think the incident involves (two students' exams with exactly the same string of errors, for example, or a paper that seems
plagiarized because the student's style is so different and so much better than previous work, etc.).

2. Arrange to meet with the student to discuss the incident (you may want to ask one of your TAs to join that meeting, or Academic Affairs would be pleased to participate if you would feel more comfortable that way)—it is very important to hear what the student has to say.

3. If, at the conclusion of that meeting, you still feel that the student has broken academic conduct—regardless of whether he or she has admitted to it— you need to follow University procedures as spelled out in the NYU Shanghai Bulletin. The Assistant Dean for Academic Affairs is charged with helping you navigate those procedures.

Confidentiality: Maintaining confidentiality throughout the entire process including after any punishment is meted out is very important. The only persons outside of the course instructor that should know the individual or individuals involved in the incident is the Assistant Dean for Academic Affairs and the Assistant Provost for Academic Affairs.

For clarity, maintaining confidentiality includes:

1. During the discovery phase – if you need a second opinion to determine if academic conduct is not followed, remove anything that identifies the student.
2. Discussion with the student(s) – student X should not know that you also suspect student Y unless that is necessary for determining what actually occurred.
3. During the punitive stage – the letter is written to the student but it is not shared or the contents made known to anyone else beyond as necessary to enforce sanctions.
4. After the punishment – students have the right to a second chance so no mention of the event to anyone should be made in any context, except if called on by Academic Affairs or Student Life in their role of maintaining Community Standards.
5. If you happen to learn of an academic conduct incident involving a student you are under the same obligations of privacy including not letting the student know that you are aware of their situation.

Violations of Academic Integrity include, but are not limited to:

- Cheating: Intentionally using or attempting to use unauthorized materials, information, notes, study aids, or other devices in any academic exercise.
- Fabrication and Falsification: Intentional and unauthorized alteration or invention of any information or citation in an academic exercise. Falsification is a matter of inventing or counterfeiting information for use in any academic exercise.
- Multiple Submissions: The submission of substantial portions of the same academic work for credit (including oral reports) more than once without authorization.
- Plagiarism: Intentionally or knowingly presenting the work of another as one’s own (i.e., without proper acknowledgment of the source).
- Abuse of Academic Materials: Intentionally or knowingly destroying, stealing, or making inaccessible library or other academic resource materials.
- Complicity in Academic Dishonesty: Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.

Plagiarism includes, but is not limited to:

- Copying or borrowing liberally from someone else’s work without his/her knowledge or permission; or with his/her knowledge or permission and turning it in as your own work.
● Copying of someone else’s exam or paper.
● Allowing someone to turn in your work as his or her own.
● Not providing adequate references for cited work.
● Copying and pasting large quotes or passages without properly citing them.

**Title IX Compliance:** From the [NYU Title IX website](https://www.nyu.edu/titleix): “Title IX of the Education Amendments of 1972 (Title IX) prohibits discrimination on the basis of sex in educational programs. It protects victims of sexual or gender-based bullying and harassment and survivors of gender-based violence. Protection from the discrimination on the basis of sex includes protection from being retaliated against for filing a complaint of discrimination or harassment. NYU is committed to complying with Title IX and enforcing University policies prohibiting discrimination on the basis of sex. Mary Signor, Executive Director of the Office of Equal Opportunity, serves as New York University’s Title IX Coordinator. The University’s Title IX Coordinator is a resource for any questions or concerns about sex discrimination, sexual harassment, sexual violence, or sexual misconduct and is available to discuss your rights and judicial options. University policies define prohibited conduct, provide informal and formal procedures for filing a complaint and a prompt and equitable resolution of complaints.

Complainants in situations involving sexual misconduct are afforded certain rights specified in the [Sexual Misconduct, Relationship Violence, and Stalking Policy](https://www.nyu.edu/titleix/policies/sexual-misconduct.html) (“the Policy”). Where immediate assistance is required, emergency help is available. In addition to using the complaint procedures under University policies, Complainants have the option to report the incident to the appropriate local authorities and the University will assist them in doing so.

**Links to the Policy and related documents:**

- [Sexual Misconduct, Relationship Violence, and Stalking Policy](https://www.nyu.edu/titleix/policies/sexual-misconduct.html)
- [Procedures for Complaints Against Students](https://www.nyu.edu/titleix/policies/complaints/students.html)
- [Procedures for Complaints Against Employees](https://www.nyu.edu/titleix/policies/complaints/employees.html)
- [Resource Guide for Students](https://www.nyu.edu/titleix/policies/complaints/students/guide.html)
- [Resource Guide for Employees](https://www.nyu.edu/titleix/policies/complaints/employees/guide.html)

The University recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a faculty member, I am interested in promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. Title IX of the Education Amendments of 1972 is the federal law that prohibits sex discrimination in educational institutions that are recipients of federal funds. Students have the right to an educational environment that is free from harassment and discrimination. Should you want to speak to a confidential source you may contact the Counseling Center.

Students have options for reporting incidents of sexual violence and sexual harassment. Sexual violence includes sexual assault, dating violence, domestic violence, and stalking. Students may receive confidential assistance at the Counseling and Psychological Services. Students may feel more comfortable discussing their particular concern with a trusted employee. This may be
a student affairs staff member, a department Chair, a faculty member or other University official. These individuals have an obligation to report incidents of sexual violence and sexual harassment. This does not necessarily mean that a formal complaint will be filed. If you find yourself in an uncomfortable situation, ask for help.”