Design Workshop

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Instructor(s):

István Keszei
Ern? Rubik

Short Description of the Course:
For many IT students absorbed in virtual reality, this workshop provides an original reminder of the potential and also of the constraints of the physical world. It encourages students to explore the notions of space, form, material and concentrated creativity in a free-flow environment under the guidance of a master of design thinking. Relying on a basic toolkit of various craftable materials such as paper, wood, and wire, students are invited to unleash their primary creative potential, giving physical shape to individual ideas. The workshop provides a hands-on introduction to key concepts and abstract principles of dimensionality, structure, and transformation, and helps students appreciate the “real” world for which our computer programs are designed and where information is both captured and revealed.

Aim of the Course:
The aim of this course is to enhance students’ creativity and problem-solving skills in 3D and to provide a holistic visual approach to design and development. The course also explains the sometimes neglected link between physical and virtual reality, revealing the nature and complexity of the creative process that requires the harmonious collaboration of software engineers and graphic designers. Furthermore, the course explores practical applications of design in several areas of interest (product design, visual communication, environmental design, and beyond).
This course facilitates creative performance with an artistic approach that broadens students’ available repertoire of cognitive and design skills, thus fostering free association, for original and divergent thinking. To get a deeper understanding of how the artist’s mind works, how to create something that is both functional and aesthetically pleasing for everyday use, how to transfer images onto paper, and how to give form to ideas or feelings, students must have visual experience and obtain visual art skills.
Finally, complex scientific problems require methods that go well beyond the traditional artistic tools of paper and pencil. Such problems are inherently suitable for computer modeling. Constructing 3D models has become standard practice not only for formulating solutions but even for finding and giving shape to potential problems.

Prerequisites:
Curiosity and a strong interest in the various layers of creative expression from craftsmanship to 3D design are key for this class. Manual skills and preliminary hand-drawing experience are helpful, although not essential.

Detailed Program and Class Schedule:

Content	Contact hours	Schedule
Introduction	1	Week 1.
Project I. Shaping surfaces	14	Week 1-4.
Project II. Self-Propelling objects	18	Week 5-10.
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Midterm presentations – “Hungarian inventors and inventions”	2	Week 8.

Project II. Continuing Self-Propelling objects	18	Week 5-10
Project III. Get inspired by nature	20	Week 10-15.

Introduction -theoretical and practical preparation for the project assignments
Introduction, aims, methods, grading requirements.
Assignment of midterm essays: „Hungarian inventors and inventions"
Presentation from Ern? Rubik
The definition of "design": The mistaken definition of „design" in everyday vocabulary. Design as approach: defining and solving problems. The importance of design in software engineering.
Methods of research for future project assignments.

Project assignments
There will be four project assignments throughout the semester. Project assignments aim to provide hands-on experience and understanding of creating new structures by transformation. Starting out from the basic characteristics of a given material (e.g. paper) various operations (e.g. folding or cutting) result in transformations of structure (from flat surfaces to shapes with cubic capacity). Repeated use of such transformations brings along new structures revealing different characteristics of the starting material. Students will get insight into the theory of 3D modeling by creating computer-based 3D models, as well as hands-on experience with a working 3D printer by printing the models in the class.

Each project starts with a demonstration of an example / model presented by the instructor. The second step is brainstorming and research. Students work on each project for 8-14 contact hours afterwards with assistance from the instructors and are expected to work also in between the classes. Each project will be evaluated separately before starting the next one.

A group of students will be chosen to pick one of their projects and present it in detail (problem definition, research work, design procedure, and outcomes) at the closing event.

Project I. Shaping surfaces – individual assignment
Transforming 2D paper into 3D surfaces by cutting or folding.

Project II. Self-propelling objects – group assignment
The focus of this project is on rubber band-powered moving objects. Teams of students construct self-propelling objects using paper, wood sticks, soft materials, and 3D-printed components. Objects must be capable of rolling or flying movements by using stored energy.

Project III: Get inspired by nature / building 3D forms – individual assignment
Students will find a shape or structure in nature and then dissect and simplify it to basic geometric forms. The new structure will be created by using paper or other soft materials. Creating simple geometric shapes in 3D, using slice techniques on the basis of the operation of the 3D printers or any folding techniques based at **Slicer for Fusion 360** software.

Midterm
The midterm assignment is individual research work. Each student will pick a Hungarian inventor or invention from a list provided, and research the topic for 9 weeks. At the beginning of the second half of the semester, students will have to hold a presentation.

Method of instruction
This 4-credit course meets twice a week, alternating between lectures and project work. The course was founded by Ern? Rubik and he is supervising the instructor, István Keszei. Classes are structured around lectures (focusing on design theory and applications) and individual creative projects in a workshop.
In the context of instructor-guided individual and team project work, creative skills are enhanced in free-hand drawing, descriptive geometry, use of materials, dimensionality, and structure. The workshop is not driven by a focus on handicraft itself. Rather, creative work is employed to deepen understanding of the visual experience and of the underlying structures of nature. The aim is not to become a designer but to understand the designer's task.

Grading system:

Class participation & Activity	40%
Individual work (Midterm essay and presentation, Project I. and Project III.)	30%
Group work (Project II.)	20 %
Presentation & communication skills	10 %

Textbook:
Design history and theory – handouts

Instructors' bio:

István Keszei (born in 1974) graduated from the Moholy-Nagy University of Art and Design (MOME) in Budapest as an industrial designer. He commenced his Ph.D. studies at MOME in 2012, where he has been lecturing since 2010. His Ph.D. thesis is titled "design for disaster situations." He is currently teaching a course at MOME on intelligent materials and technology and presentation skills with 2D/3D. He has received several national and international design awards and honors, including the 2009 Pál Takács Scholarship for Academic Achievement for best industrial design student of the year. He currently also works as an industrial lighting and electronics designer.

Ern? Rubik (born in 1944 in Budapest) studied architecture and design in Budapest and after graduating, worked as an assistant professor. While trying to give his students a true "feel" for abstraction and complexity, Mr. Rubik developed several 3D constructions, among them his best-known puzzle, the Rubik's Cube.

In addition to the Cube, he patented several successful toys and design pieces including the Magic Snake in 1977 and Rubik's Magic in 1985, selling millions of both worldwide. He has also remained a prolific architect, largely designing family homes, and is actively engaged in interior design. He co-founded the Hungarian Academy of Engineering, the Palace of Marvels (a science center in Budapest), and most recently the Aquincum Institute of Technology (AIT) where his latest public sculpture is on display.

A recipient of numerous national and international distinctions, Mr. Rubik has also been engaged in major international projects promoting innovation and creativity. He acted as Ambassador to the European Year of Innovation and Creativity, convened by the European Commission in 2009 and is a 2011 and 2012 member of the European Inventor Award's international jury.