DRAWING FOR FURNITURE: 3D

Rhode Island School of Design
Department of Furniture Design
semester: Spring 2018
FURN-2511, Sections 01 & 02 (3 credits)
2nd Floor of Prov-Wash Building, Room 202 and 237B
Mondays, 1:10pm – 6:10pm
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COURSE DESCRIPTION

With its capacity for rapidly developing and realizing design concepts, 3D CAD modeling has become an indispensable part of the contemporary design process. The goal of this course is for students to develop competency with CAD modeling, and an increased sensitivity to the creative potential that this media presents to designers. Work in the class will center around learning to use the popular, powerful CAD modeling application Rhinoceros.

Many of the projects in this class will have a physical object as the deliverable. A primary concern of the course will be developing methods to deal with the disconnect between working on-screen and working with real materials in physical space. This will be facilitated through experiments with a variety of technologies, both sophisticated (such as CNC machining) and basic (drawing, printing). Ultimately, students should come away from the class equipped with a variety of processes and skills that will contribute to their productivity and creativity as designers and makers.

LEARNING OUTCOMES

Successful performance in this class will yield the following outcomes for students:
- intermediate level proficiency with Rhinoceros 3D modeling software, Keyshot rendering software, and MasterCAM CNC software
- a working knowledge of the underlying structure of NURBS surfaces and how to devise effective modeling strategies for a variety of forms
- an understanding of the core geometric concepts of curves, surfaces, and solids and how to control continuity between objects
- a solid foundation for future self directed growth with the various software introduced in the class
- experience developing strategies to mitigate the challenges associated with developing three dimensional objects in a two dimensional, screen-based work space
- practical experience with several digital fabrication technologies, including: 3D printers, laser cutters, and CNC routers

COURSE STRUCTURE

Class time will be occupied by a balance of demonstrations, lectures, critiques, discussion, exercises, and work on projects. Many classes will begin with a short exercise intended to challenge the student's skills with the software and to encourage resourcefulness and problem solving. These exercises will raise important issues inherent to the software in an effort to develop awareness of the technology's limitations and sensitivity to its fundamental qualities.

COURSE REQUIREMENTS

There will be several projects throughout the semester, some of which will be completed in one week, others spanning multiple weeks. In addition to the weekly deadlines assigned for these projects, other skill building exercises will be assigned. Outside of class, participation in web-based activities conducted on the class website and shared Google Drive will be required, including posting progress and documentation of projects and contribution to discussions. In general, all students are expected to check the class website daily. Tutorial videos that demonstrate techniques with the software will be posted to the site throughout the semester and students are expected to watch these videos as they are posted. In addition to work on projects and exercises, quizzes will be given to assess the student's grasp of fundamental concepts.

Students will be required to build a web portfolio page for each project displaying the project from start to finish. This will require photographic documentation and the creation of screen images of the various phases for each project. Every RISD student has an account with RISD portfolios and this is the default platform we will use for this purpose. If students already have a web-based portfolio with a different system they are welcome

to use it for this class. Students using RISD portfolios have the option to make projects viewable only to members of the class if they do not wish for the project to publicly viewable.

Although a primary objective for this class is to learn software, this is not "just a computer class". Students will be expected to be invested in the design and execution of their projects, with an attitude that views the conceptual, theoretical, and technical aspects of the course content as mutually beneficial to the student's development. Significant off-screen work will be required to satisfactorily execute projects as physical objects - sketching, sanding, finishing, etc.

SUPPLIES & SOFTWARE

Students in this class are expected to have their own laptop computer, as well as a three button mouse (right and left buttons + scroll wheel/ button). Rhinoceros 3D modeling software and Keyshot rendering software will be used throughout the semester and students should have these both installed on their laptops - either the Windows or Mac versions of these applications are acceptable. Several projects will also require students to use MasterCAM. A "Home Learning Edition" of this software is available for students to use at home, for free. The Furniture Design Department Computer Lab also has a license of this software available for student use, but please note that this software only runs on the Windows OS. To run this software on an Apple laptop, it is strongly recommended that students create a virtual machine with the software Parallels Desktop.

Students will also be required to have other standard art and design tools and supplies for use in the class, such as rulers, utility knives, drawing implements, etc.

The class website will provide links for students to find the most economical purchasing options for the class's required software. The list below outlines the software that will be used in the class and how much you can expect to pay for it:
- Rhino (3D Modeling) $80 from RISD store, demo may work for semester
- Keyshot (Rendering) students receive a license as part of lab fee
- Windows 10 (Operating System) free from RISD's On the Hub webstore
- Parallels (Operating System Virtualization) $30 from On the Hub
- MasterCAM Home Learning Edition (CAM) free

COURSE POLICIES

This course will follow RISD's policies as well as those set by the Department of Furniture Design, including the department attendance and critique policy, which has been distributed separately and is available in the Department Office.

The webpage linked below provides detailed information on RISD's Academic Policies, including those addressing attendance, grading, conduct, intellectual property, and non-discrimination:
http://policies.risd.edu/

The link below provides information regarding Disability Support Services, which can assist in coordinating accommodations for students with cognitive, psychological and physical disabilities.
http://info.risd.edu/disability-support-services-dss/

It is of crucial importance that students follow departmental and school policies and rules for shops, studios, labs, classrooms, and other facilities. Students are expected to keep communal and personal spaces in the Prov Wash studios clean, neat, and free from trash or clutter. Personal desk spaces should be clear and suitable for working on laptops with a mouse. Failure to use facilities safely and respectfully will be reflected in grading.

GRADING CRITERIA

In general, this course will follow the Department of Furniture Design grading and attendance policies, which have been distributed separately and are available in the Department Office as well as on the course website. Students will also be expected to participate in class discussions and be active contributors to a vibrant, engaged, critical, and supportive class

community. In addition to work on assignments, performance in the class
will be evaluated on the following criteria: engagement in one-on-one
and group discussions; effort and ability to engage fully in the subject
matter; timeliness in completing projects; respectful and safe use of
facilities; and attendance and punctuality.

In general, letter grades fall along a spectrum where "A" represents
excellent performance, "B" above average, "C" average, "D" below average,
and "F" failing. For the purposes of determining grades, "A" level
performance will be characterized by excellence in the criteria listed
below, with grades declining as performance in these same criteria
declines:

- the student was punctual and attended all classes
- the student challenged themselves and grew significantly through their
  engagement with the content of the course
- the student was an active member of the class community who made
  genuine efforts to engage with and support the work of their peers
- the student completed all assignments and projects on time, with
  excellence
- the student's projects demonstrated increasing competency to build
  complex objects with Rhinoceros and to create realistic renderings
  with Keyshot
- the student demonstrated resourcefulness, problem solving, and
  creativity when faced with challenging modeling problems
- the student's work demonstrated competency with MasterCAM and an
  awareness of the limitations and capabilities of 3 axis CNC routing
- the student successfully translated their work from concept, to
  digital model, to a compelling physical object, using the various
  outputting tools covered in class sensitively and appropriately
- the student was a good citizen - outside of and within RISD and the
  Department of Furniture Design - following school and department
  policies and using facilities safely and respectfully

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Department of Furniture Design
Rhode Island School of Design

SCHEDULE Project schedules will overlap, and assignments for multiple projects may be due at the same time. This is done in an effort to provide adequate time for design development, modeling, execution on various digital fabrication equipment, assembly, and finishing. See the attached table for a detailed calendar of class activities and events.

Work in this class will be divided into five major modules, each focusing on a particular skill set or technology. Each module will include design briefs for projects with specific deadlines, deliverables, and evaluation criteria for assignments.

Drinking Glasses
basic drawing, modeling, editing, & rendering
Chair Study
Drawing in 3d, Plotting
Paper Model
Developable Surfaces, Digital Cutting
Name Plate & Plywood Stool
Nesting parts, Modeling Structure, Curve Driven CAM, 2D CNC Machining
Utensil
Surface Continuity, 3D CNC Machining, Surface Driven CAM

3D 2016	Week 1	Week 2	Week 3	Week 4	Week 5	Spring Break	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
	2/19/2018	2/26/2018	3/5/2018	3/12/2018	3/19/2018	3/26/2018	4/2/2018	4/9/2018	4/16/2018	4/23/2018	4/30/2018	5/7/2018	5/14/2018	date TBA
Uncategorized														
Assignments	Install Keyshot Install Rhino		Mustard Bottle Tutorial	Install Windows Install MasterCAM										
In class	Intro to Rhino Demo Transform Challenge Draw + Revolve Challenge	Lego Challenge Trace Challenge 3D Drawing Challenge	Pencil Challenge	Boat Challenge			Torqued Ring Challenge Continuity Lecture NURBS Lecture	Quiz	X Challenge	Y Branch Challenge	Steel Spoon Challenge	Collect Maylines	Critique	Individual Meetings
Glasses														
Assignments	Sketches Model Rendering Description	Comment Revisions (optional) 3D Print Specification Drawing Portfolio Page												
In class	Quick Model + Render Demo	3D Printing Lecture												
Chair Study														
Assignments		Model Rendering	Plot Drawing (optional) Portfolio Page											
In class		Texturing Demo	Plotter / Cutter Demo											
Paper Model														
Assignments		Bring in Object to Model	Rough models Renderings	Final Models	Portfolio Page									
In class		Introduce project	Paper Model Lecture Unroll Demo Tabs / Assembly Demo Setting up Files for Laser Cutter	Review Rough Models	Show Final Models									
Name Plate						Due 4/2/2017								
Assignments					Design Name Plate Name Plate MasterCAM									
In Class					Intro to CNC Lecture Cat Face Cut Demo Cat Face CAM Demo Cat Face CAM Exercise	Cut Names								
Plywood Stool														
Assignments				Sketches 1:3 Scale Model Screenshot Nesting Pattern Print	Design Revisions 1:2 scale model Screenshot Nesting Pattern Print		Refine Design CAM Rendering Stepstool Demo CAM	Revise CAM Submit for approval Sign up for Cut Time Cut/Finish/Assembly	Cut Assembly Finish	Cut Assembly Finish	Cut Assembly Finish	Cut Assembly Finish Portfolio Page		
In class				Introduce Project In Class Work	review 1:3 models		review 1:2 models Nesting offsetting for CAM MasterCAM Demo work on project	Review / Revise CAM				**Critique**		
Utensil														
Assignments									Sketches Model Preliminary Rendering Physical model	Revise Model Rendering CAM	Revise CAM Submit CAM file Cut Finish	Cut Finish	Portfolio Page	
In class									Introduce Project	SurfaceToolpath Lecture	work on project approve CAM files		**Critique**	
Due														
			Glasses: Sketches Glasses: Model Glasses: Rendering Glasses: Description	Glasses: Comments Glasses: Revisions (optional) Glasses: 3D Print Chair: Model Chair: Rendering Paper Model: Brinig in Object	Glasses: Portfolio Page Paper Model: Rough Model Paper Model: Rendering	Paper Model: Final Model		Paper Model: Portfolio Page Name Plate: Design + CAM Plywood Stool: Sketches Plywood Stool: 1:3 Model Plywood Stool: Screenshot Plywood Stool: Nesting	Plywood Stool: Revisions Plywood Stool: 1:2 Model Plywood Stool: Screenshot Plywood Stool: Nesting	Plywood Stool: CAM Plywood Stool: Rendering	Plywood Stool: Final CAM Utensil: Sketches Utensil: Preliminary Model Utensil: Physical Model Utensil: Rendering	Utensil: Revised Model Utensil: CAM Utensil: Rendering	Utensil: Final CAM	Finished Plywood Stool Finished Utensil	Plywood Stool: Portfolio Page Utensil: Portfolio Page