Introduction to Digital Media 2
Carnegie Mellon University
School of Architecture
Spring 2011

Course Information

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Office hours: M/F 11:30-12:30 MMCH 201 (by appointment)

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Course Objectives

Students enrolled in this course will:
1. apply various digital and analog tools in the context of design problems
2. understand and apply basic concepts of digital fabrication
3. understand the relationships between two and three-dimensional geometry in digital modeling software
4. apply laser cutting to produce physical objects from virtual models
5. understand methods to construct three-dimensional form from planar material, facilitated through digital fabrication
6. apply advanced rendering tools to produce realistic architectural simulations including natural and artificial light
7. apply time-based modeling software to generate design iterations

Overview

Software and hardware have been used in the design disciplines for quite some time, initially as instruments of efficiency and representation and subsequently as design and production tools. As design and fabrication processes become increasingly reliant upon evermore-sophisticated tools, a designers process vacillates between virtual simulation and physical reality; two-dimensional material limits and three-dimensional constructed form. As a result, the designer of today and tomorrow must be capable of understanding the various forms of translation facilitating these shifts and the potential to significantly alter the design process resultant built form.

This is the second component in the digital media introductory course sequence within the School of Architecture. The course content and projects build upon the lessons of last semester and are principally focused on the various forms of translation between 2d and 3d as well as virtual and physical models.

Expectations

This course is NOT strictly skills based. While techniques will be addressed through the lab sessions, bias will be placed on developing critical thinking skills that transcend a particular software application and promote a deep engagement of digital media and its relationship to architecture and design. Students will be expected to further explore the material addressed in class through weekly readings.

The assignments for this course are independent from studio until spring break, after which both courses will be tightly integrated. Weekly lectures will provide an introduction to the material subsequently addressed in the lab sessions. The lectures provide a contemporary context for the utilization of digital media related to the processes of design and making.

Operating Procedures

Attendance

Due to the nature of course instruction, attendance and on time arrival to BOTH the lecture and lab is critical and required. Attendance will be logged at the beginning of each course. You are allowed 1 unexcused absence, after which both courses will be tightly integrated. Weekly lectures will provide an introduction to the material subsequently addressed in the lab sessions. The lectures provide a contemporary context for the utilization of digital media related to the processes of design and making.

Additional material will be posted on the website and/or distributed in class on an as needed basis.

Readings

There is a reading list that accompanies the weekly lectures, I will often reference the readings and work contained within. You are strongly encouraged to familiarize yourself with the readings and the associated projects as most are significant to the topics at hand and the discipline in general. A written response to each reading will count as extra credit towards your final grade. See ‘extra credit’ for additional information.

Course Organization

IDM has two distinct components:
1. Lectures
2. Labs

Lectures

- Introduction to underlying concepts, theories and practices
- Immersive instruction, case study examples

Labs

-  Immersive instruction, case study examples

Assignments

- Late assignments are not accepted

Distractions

Use of cell phones, pagers and all other communication devices is strictly prohibited during class time. STUDENTS USING ANY FORM OF EMAIL OR P2P SOFTWARE WILL BE ASKED TO LEAVE CLASS.

Assignment completion

Each assignment must be uploaded to blackboard and viewable by the time specified. Late assignments are not accepted and receive a grade of 0.

Sickness and emergencies

Please contact me if you must miss class for sickness or other another emergency. This will enable us to discuss the duration of missed classes and plan as best to prevent you from falling behind.

Disabilities

Students with disabilities should contact me to schedule a meeting to discuss academic accommodations. Please be prepared to provide the university accommodation letter.

CMU DIGITAL MEDIA REQUIREMENT

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Evaluation and Grading

A – R grading convention is used in this course. All grades are earned!

A
Highly advanced technical and design skills clearly evident through consistently rigorous work. Proven experimentation with various media. All assignments completed on time.

B
Above average technical and design skills. Marked development in design and technical skills over the course of the semester. Potentially 1 missed assignment.

C
Produces average work that fulfills the bare requirements of each assignment. Potentially 2 missed assignments.

D
Assignments lack the depth of understanding for the issues at hand. Work is insufficient and incomplete. Potentially 3 missed assignments.

R
Requirements of course not met. Missing more than 3 assignments.

Project weighting

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>Project 1</td>
</tr>
<tr>
<td>10%</td>
<td>Project 2</td>
</tr>
<tr>
<td>20%</td>
<td>Project 3</td>
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<tr>
<td>20%</td>
<td>Project 4</td>
</tr>
<tr>
<td>15%</td>
<td>Project 5 – studio coordinated</td>
</tr>
<tr>
<td>20%</td>
<td>Project 6 – studio coordinated</td>
</tr>
</tbody>
</table>

Extra credit

5 points: A thoughtful half-page typed response to all five of the assigned readings will result in the addition of 5 points to your final grade. I am not interested in a synopsis, but rather YOUR reaction/reflection to/of the readings.

CMU DIGITAL MEDIA REQUIREMENT
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Project 2: Analytical Drawing

Description
Produce a composite drafted drawing, utilizing two and three-dimensional drawing conventions. The drawing shall be composed of the following: 1:1 shaded plan, 1:1 longitudinal section, axonometric.

Goals
Understand the Rhino–AutoCad–Illustrator workflow
Utilize projective view tools to generate 2D line drawings from 3D geometry
Utilize layers and transparency to achieve visual complexity while retaining logic

Specifics
Virtual output: PDF
Physical output: 18” x 24” plot (landscape orientation and cut to size) on Strathmore or Arches hot press paper

Schedule:
1.31 Project assigned  
2.7 Project due at beginning of class

Grading and Evaluation Criteria
You will be graded on the following:
• Completeness of drawings
• Utilization of line-weight and tone
• Graphic Composition
Project 2 equates to 10% of the final grade.

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Project 3: Building Section

Overview
For project 3 and 4, the class will be assigned 4 canonical North American Louis Kahn buildings to serve as the basis for architectural analysis and representation. The projects are assigned alphabetically as follows: [A-C] Esherick House; [D-G] Kimbell Art Museum; [H-L] Phillips Exeter Academy Library; [M-P] Fisher House; [Q-S] Salk Institute; [T-Z] Yale Center for British Art. Projects 3 and 4 will require the construction of a digital model of your assigned building. This will serve as the geometrical basis for the various facets of both projects.

Description
Using the underlying geometric principles and basic dimensions of the assigned buildings, you are to construct a three-dimensional Rhino model that will subsequently be used to complete projects 3 and 4. Therefore, it is critical to produce an accurate and detailed model. You are not permitted to scan and trace drawings as it will not preserve the geometric principles and prove less accurate as a method. For project three, you will cut a section through your three-dimensional Rhino model of the assigned building and use AutoCad to further embellish the resulting two-dimensional drawing to add information and lend scale. While this section can be cut anywhere through the building, you are challenged with finding the most informative location.

Workflow
Successful completion of this project will require the use of AutoCad for drafting, Rhino for three-dimensional modeling and Adobe Illustrator for final layout and printing. It must be obvious that geometric construction lines have been utilized in the creation of the drawing and model. These should be placed on a unique layer and not deleted.

Goals
Understand the virtual modeling and architectural drawing workflow in Rhino and AutoCad
Create a legible and detailed architectural drawing

Resources
Books containing dimensioned drawings of the four Kahn buildings are on IDM2 course reserve in the library.

Specifics
Virtual output: ZIP archive that includes: 2d AutoCad drawing, 3d Rhino model, final PDF
Physical output: 18” x 24” plot (landscape orientation and cut to size) on Strathmore or Arches hot press paper
One sheet for the section drawn at ¼” = 1’-0”

Schedule:
2.7 Project assigned  
2.28 Project due at beginning of class

Grading and Evaluation Criteria
You will be graded on the following:
• Level of information conveyed through section
• Use of construction lines in geometry creation made evident through existence in files
• Clarity of constructions through use of line-weight, tone, etc.
Project 3 equates to 20% of the final grade.
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Project 4: Hybridized Building Section and Analytical Diagram

Overview
For project 3 and 4, the class will be assigned 4 canonical North American Louis Kahn buildings to serve as the basis for architectural analysis and representation. The projects are assigned alphabetically as follows: [A-C] Esherick House; [D-G] Kimbell Art Museum; [H-L] Phillips Exeter Academy Library; [M-P] Fisher House; [Q-S] Salk Institute; [T-Z] Yale Center for British Art. Projects 3 and 4 will require the construction of a digital model of your assigned building. This will serve as the geometrical basis for the various facets of both projects.

Description
Using the base three-dimensional model created for project 3, you are to describe your building through two distinct representational methods, a perspectival section and an analytical drawing. The successful completion of these “drawings” will require the use of both raster and vector drawing methods to produce seamless hybridized products. Both drawings must utilize rendering in some form to communicate the quality of light within the chosen spaces. While this section can be cut anywhere through the building, you are challenged with finding the most informative location to cut your section.

Goals
- Understand the virtual modeling and architectural drawing workflow in Rhino
- Understand how to utilize virtual lighting and rendering to simulate the play of light within a virtual model
- Understand basic VRay Rhino rendering techniques
- Create a legible and detailed architectural drawing

Resources
Books containing dimensioned drawings of the four Kahn buildings are on IDM2 course reserve in the library.

Specifics
- Virtual output: PDF uploaded to Blackboard (page size must be 18” x 24” landscape orientation)
- Physical output: Schedule:
  - 2/28 Project assigned
  - 3/21 Project due at beginning of class

Grading and Evaluation Criteria
You will be graded on the following:
- Level of information conveyed through section
- Manipulation of light through your space
- Rendering and drawing quality
- Clarity of drawings through use of line-weight, tone, etc.

Project 4 equates to 20% of the final grade.

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Project 5: TIME-BASED DIAGRAM

Description
You are to utilize animation techniques to produce a time-based diagram of your studio project. The result should be understood as a communicative device in which the animation of form reveals the formal logic and intent of the project at hand. As such, the intent is diagrammatic clarity rather than cinematic representation.

Goals
- Critically utilize 4d media to communicate intent
- Develop an understanding of the basic animation tools within 3ds max
- Understand and apply global illumination and aspects of indirect lighting

Specifics
- Duration: 15 seconds @ 20fps
- Size of Output: TIFF format @ 490 pixels by 270 pixels
- File Format: QuickTime movie (.mov)
- RAM Player: Choose H.264 under compressor type and Best for quality
- File name must use Andrew ID: ficca_6.mov (ex)
- Schedule:
  - Due: 5/9 due to Blackboard by Noon

Grading and Evaluation Criteria
You will be graded on the following:
- Conveyance of intent
- Control of camera(s), light(s) and objects
- Fidelity and completeness of 3d model

Project 5 equates to 15% of the final grade.
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Project 6: SEQUENCE RENDERINGS

Description
You are to generate an evocative sequence of rendered images that illustrate the spatial conditions found throughout your studio project. The play of light and composition of view are critical components and must receive careful consideration.
Similar to a film story-board, the image sequence should be understood as a device that can imply movement, allude to conditions not fully captured within the frame and provide evidence to where one has been and is approaching.

Goals
Understand the Rhino – V-Ray workflow
Apply exterior and interior lighting
Understand and apply global illumination and aspects of indirect lighting
Understand and apply simple material attributes

Specifics
Virtual output: 4" x 24" PDF of rendered sequence (6 renderings)
Physical output: Used in your studio review
Schedule:
4.4 Project assigned
5.2 Project due to Blackboard by 5pm

Grading and Evaluation Criteria
You will be graded on the following:
• Completeness of model
• Placement of cameras and choice of views
• Placement of lighting and control of tonal range
• Utilization of basic material settings
Project 6 equates to 20% of the final grade.