

**Course Outline – 2008/2009 Academic Year
IAT 337-3: Representation and Fabrication
School of Interactive Arts and Technology**

Instructor: Halil Erhan

Location: SFU Surrey, Room 2600

Prerequisite: IAT 233 or 230.

Course Description:

This course introduces students to advanced computer tools for representing designs and to the techniques needed to use such tools for accurate and precise specification, including concepts of tolerances. It teaches how to use data from such representations as input to computer numerical control fabrication equipment (such as laser cutters, 3D printers and n-axis mills) and combine representation and fabrication into an iterative design process. Application to designing a family of related artifacts provides a context in which issues of reuse, design rules and inter-design coherence are crucial.

This course comprises of three parts as follows:

The first part is instruction in advanced representations for designs, including solid modeling, parametric modeling, methods of representing object behavior and design analysis using finite element techniques. This part includes an introduction to the use of physical fabrication tools such as laser cutters, 3D printers and n-axis milling machines.

The second part is an introduction to the reuse of design ideas across designs and design projects. Such reuse is often critical to a firm's continuing success and can be realized through techniques of inter-design coherence, design rules and software reuse in design systems.

The third part is use of representation and fabrication with a design project that stresses the need for such capability. An example problem would be to create a family of related artifacts.

Courses Objectives:

After completing this course, students will be able to:

- Use computer tools to represent designs for digitally enabled objects.
- Use computer-based representations as input to fabrication systems.
- Understand issues involved in preparing representations within a professional design context, including dimensional conventions and tolerancing.
- Understand concepts of coherence of design ideas across related artifacts, design rules and component and concept reuse.
- Apply the above concepts to the problem of designing a family of related artifacts.

Learning Activities & Evaluation:

- Lab activities and programming assignments (multiple activities and assignments spread throughout the course): 30%
- Projects: 40%
- Exam: 30%

Texts, Resources & Materials:

Recommended:

"SolidWorks 2007 Bible" (2007) by Matt Lombard; Wiley; ISBN: 0470080132

"SolidWorks Surfacing and Complex Shape Modeling Bible" (2008) by Matt Lombard; Wiley; ISBN: 0470258233

NOTE: These outlines are drafts and are subject to change.

Reference:

"Digital Design and Manufacturing: CAD/CAM Applications in Architecture and Design" (2006) by Daniel Shodek, Martin Bechthold, Kimo Griggs, Kenneth Martin Kao and Marco Steinberg

"Fabrication: Examining the Digital Practice of Architecture" (2004) by Beasley, Phillip, Alice Cheng and Sean Williamson; Proceedings of the 2004 AIA/ACADIA Fabrication Conference; University of Waterloo

"New Technologies in Architecture: Computer-Aided Design and Manufacturing Techniques" (2000) by Bechtold, Martin, Kimo Griggs, Daniel L. Schodek and Marco Steinberg; eds.; Cambridge: Harvard University Graduate School of Design

"New Technologies in Architecture II & III: Computer-Aided Design and Manufacturing Techniques" (2003) by Bechtold, Martin, Kimo Griggs, Daniel L. Schodek and Marco Steinberg; eds.; Cambridge: Harvard University Graduate School of Design

"Exploring 3d modeling with Maya 7" (2007) by Patricia Beckmann, Scott Wells; Thomson Delmar Learning; Clifton Park, NY

"Computer-Aided Manufacture in Architecture: The Pursuit of Novelty" (2001) by Nick Callicott; Architectural Press, Jordan Hill, Oxford

"Applied solidWorks" (2006) by L. Scott Hansen; Industrial Press, New York

"Emergence: Morphogenetic Design Strategies" (2004) by Michael Hensel, Achim Menges and Michael Weinstock; eds.; Architectural Design; Academy Press, London

"SolidWorks For Dummies" by Greg Jankowski; For Dummies (Computer/Tech); (Paperback)

"Architecture in the Digital Age: Design and Manufacturing" (2004) by Branko Kolarevic; Spon Press, New York, NY

"Performative Architecture: Beyond Instrumentality" (2004) by Branko Kolarevic and Ali M. Malkawi; eds.; Spon Press, New York, NY

"Computer Aided Design: Software and Analytical Tools" (2005) by C. S. Krishnamoorthy, S. Rajeev and A. Rajaraman; Alpha Science International; Harrow, U.K

"Digital Tectonics" (2004) by Neil Leach, David Turnbull and Chris Williams; Academy Press, London

"Designing for a Digital World" (2002) by Neil Leach; ed.; Academy Press, London

"Digital Ground: Architecture, Pervasive Computing and Environmental Knowing" by Malcolm McCullough, Richard M. Lueptow, Michael Minbiole

"Applied Geometry for Computer Graphics and CAD" (2005) by Duncan Marsh; Springer, London, New York

"Versioning: Evolutionary Techniques in Architecture" (2002) by Gregg Pasquerili and SHOP editor; Architectural Design; Academy Press

"Contemporary Techniques in Architecture" (2002) by Ali Rahim; ed.; Architectural Design; Academy Press, London

"Design Through Making" (2005) by Robert Sheil; ed.; Architectural Design; Academy Press, London

"SolidWorks 2006 for Designers" by Sham Tickoo; (Paperback)

"CATIA V5R16 for Designers" by Sham Tickoo; (Paperback)

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