Computer Modeling for Digital Fabrication

Face to Face Course Syllabus

Ashley Goodenough : Capstone Part 2 "Anatomic"

Course Information		Instructor Information	
Course Number/Section	ATCM3355.001.25F	*Professor*	Andrew F. Scott
Room	ATC 3.605	*Office Phone*	7501
Course Title	Computer Modeling for Digital Fabrication Fall	*Email Address*	andrew.scott1@utdallas.edu
		Office Location	ATC 1.913 3d Studio 1.910
Term	2025	*Office Hours*	By appointment only via Teams
Days & Times	Mon: 1:00pm -3:45pm		

All emails subject lines must contain "ATCM 3355: "Brief topicl"

Course Pre-requisites, Co-requisites, and/or Other Restrictions
Prerequisite: ATCM 2355 or ATCM 2301 or ANGM 3306. (0-3) T

Course Description: ATCM 3355

Computer Modeling for Digital Fabrication (3 semester credit hours)
This course is designed to provide students with a broad overview of computer modeling techniques associated with fabrication processes. In this course, students will learn to apply 3D modeling software, rendering programs, image processing software, and vector-based graphics to digital fabrication processes. Emphasis will be placed on proper file preparation for output devices. Lectures and hands-on activities focus on digital fabrication's role and its relationship to the history of object making.

Student Learning Objectives/Outcomes
The following course goals articulate the general objectives and purpose of this course:

- Students will gain a historic, theoretical and practical understanding of digital technologies and their implications for contemporary artistic practice.
- Students will gain an understanding of the relationship between digital fabrication tools and computer software programs designed for developing three-dimensional forms, spaces and objects.
- Students will learn to apply the proper modeling processes needed to prepare files for digital fabrication
- Students will learn to use digital technologies to prepare schematic drawings, flat patterns for fabrication and to pre-visualize forms required Textbooks and Materials

Instructional Resources

Free Required Texts:	**Free Required Tutorials:**
ELearning Course Website ATEC Digital Fabrication Course Blogsite: To be announced Rhino Level 1 Training Guide and Models ModeLab Grasshopper Primer Keyshot 10 Manual	LinkedIn Learning at McDermott: Free *https://library.utdallas.edu/utdlynda* Learning Grasshopper Grasshopper Essential Training Introducing Rhino 7 Rhino 7 Essential Training **must be completed by the end of weeks 4**
Required Materials: Budget $100.00	**Course Software**
24'x48" Plywood Underlayment $20.00 24"x48" Cardboard. $2.00 per sheet Digital Caliper $20.00 16GB SD Card for 3d Printing $7.50 Project Finishing Materials Loctite Professional. $7.50 Paints $10.00 There are always options and alternatives for materials that can be used for projects in this course. Almost all of the materials for this course can be sourced either at Home Depot, Michaels, WalMart and Amazon	Rhino 7 $195.00 Keyshot Rendering Software $95.00 **Free Software** Rhino 7 90 day FREE license fully functional Pepakura Designer. Free The Department provides a limited number of licenses for software used in this course in the Classroom and Open Computer Lab. There are also additional licenses available in the 3d Studio. ATC 1.910 for students at no cost. Students can meet the objectives of the course using these resources and proper time management.

3D Printing			
3d Printing is provided free to students at no cost in the 3d Studio ATC 1.910. Students must supply their own materials, SD data card and know how to properly operate the Ender 6 3d printing functions with a specific emphasis on properly loading and unloading materials. Every student is responsible for attending a mandatory training workshop before they can use the printers.			
PLA 3D Printer Filament 1.75mm: $20.00	Ultimaker Cura. Free	Ultimaker Cura:Tutorial	Creality Ender 6 Manual

Grading Policy

Students must demonstrate satisfactory achievement of course objectives through fulfillment of course assignments and by contributing to class discussions and critiques. Course assignments will require students to use software and equipment available at the AHT computer labs and actual objects created by applying digital fabrication processes. Course evaluation will be based on the following.

Assignments & Academic Calendar

Topics, Reading Assignments, Due Dates, Exam Dates

Project 1: BootCamp Rhino 101: 3d Printed Castle Model Chess Pieces King/Queen		
Week 1: 8/25	Introduction Course Overview Rhino 101: Bootcamp Rhino Project 1: Sky Scraper-Tower	LinkedIn Learning Course 1: Introducing Rhino 7
Week 2: 9/1 **Labor Day** **No Class** On Your Own	Rhino 101: Software Overview Sky Scraper -Tower Demonstration Blog Posting Overview	LinkedIn Learning Course 2: Rhino 7 Essential Training
Week 3: 9/8	Keyshot 101: Create renderings using E-Learning Post Work to Course Blogsite	LinkedIn Learning Course 3: Learning Grasshopper Keyshot 10 Manual
Week 4: 9/15	**Critique Presentation 1:** **Sky Scraper Tower 10 points** **Sky Scraper -Tower Blog Posting completed in advance of class** **Project 2: Flashlight Introduced**	LinkedIn Learning Course 4: Learning Grasshopper Keyshot 10 Manual
Project 2: 3d Printing LED Flashlight Sleeve		
Week 5: 9/22	Surfacing 101 - Flashlight Model Tutorial - Modeling for Accuracy - 3d Printing Overview	Ultimaker Cura:Tutorial Creality Ender 6 Manual
Week 6: 9/29	Rhino 101 - Solid Modeling Techniques - Fillets - Start 3-D Printing Works	

Week 7: 10/6	Studio Day - 3d Printing Continued - Finishing - Work on Renderings
Week 8: 10/13	**Midterm Critique**: **Prosthetic Accessory Design Assigned**. All Blog Postings Completed and posted in Advance of class - 3-D Printing LED Sleeve - 3-D Printed Tower - LED Sleeve Blog Posting in advance of class
Modeling For Digital Fabrication	
Week 9: 10/20	Prosthetic Design Overview Surface Population Model This week should be spent mass modeling and becoming familiar with the surface population grasshopper script. Overview of Serial Slicing in Object making Slicing Setup in Rhino Review online Tutorials, Scale and Serial Slice your previous models Submit Your Models for laser cutting by the end of the week
Week 10: 10/27	Serial Slicing in Detail/ Submit your serial slicing models for processing, and build.
Week 11: 11/3	**Serial Slicing Critique Model and Blog Posting Due** in Advance of class Makercase Parametric Model introduced.
Week 12: 11/10	Architectonic Model Overview using Makercase. Makercase Workflow Research and identify grasshopper perforation algorithm.
Modeling For Digital Fabrication	
Week 13: 11/17	Architectonic Model Overview using Makercase. grasshopper perforation workflow.
Week 14: 12/1	Build and Finish Makercase Lamp
Week 15: 12/8	Makercase Lamp Critique Presentation. Finish all work on prosthetic model.
Week 16: 12/14	**Prosthetic Model and all extra credit work is due**.

Assignments	Weight
Blog Posting This is one of the **most significant** aspects of the course and should be given great consideration. Your blog postings represent the documentation of the projects and research that you undertake during the course. It should contain: ï Research, Techniques, Artistic Influences, Process Photos, Screen Shots, Renderings, and Renderings in Context You should create a Blog stream on the course blogsite for each project. You may add and revise your postings as you move through the course. Note that the blog stream is used to confirm the completion of all projects. **If it is not documented on the blog, it did not happen. All projects and work must be posted on the course blogsite to be considered for grading.** The instructions and guidelines for blog posting are documented on Blackboard and on the Assignments.	
Project 1. Boot Camp Rhino: Sky Scraper / Tower ï 3d Printed model 4" max ï 10 Points: Bootcamp Modeling and Rendering ï 5 Points 3d Print Completed and finished by week 8	**15 points**
Project 2. BootCamp Rhino II: Completion of the Following Tutorials by Week 8 ï Learning Grasshopper 5 points ï Grasshopper Essential Training 5 points ï Introducing Rhino 7 5 points ï Rhino 7 Essential Training 5 points **Post Certificates to Assignment Gradebook on Blackboard.**	**20 points**
3d Print LED Sleeve: **presented at midterm.** ï 3d Printed Flashlight/Light Saber 10 points: Computer Model and Blog Posting during the Midterm Presentation 5 points Completed 3d print model.	**15 points**
Prosthetic Accessory Assgined at Midterm Student will apply the knowledge learned through the modeling exercises to create a model of a prosthetic accessory The finished work will be a formal description and presentation of the design during finals week. This model should show the full knowledge of techniques and presentation approaches learned during the semester.	**20 points**
Internally Illuminated Surface Population Form: Volumetric Modeling Techniques Students will create an internally illuminated sculptural form using grasshopper surface population algorithms.	**15 points**
Parametric Lamp ï Students will use the makercase software or radial waffle software to design their lamp objects. They will then use a grasshopper algorithm to perforate the surface of their lamp. Students will create a design for an architectural lamp that incorporates parametric elements in the design.	15 points
EXTRA CREDIT OPPORTUNITIES: 10 POINTS MAX	

YouTube Parametric Design EXTRA Credit Students can earn 5 points for each original design they create based on online YouTube Grasshopper Tutorials. You must site the tutorial in your Blog Posting and document the work you create in a Blog Posting. The work has to be a unique application of the tutorial concepts	5 Points Each Max 10 points
Linked In Learning Course Completions Students can earn extra credit by completing online course units in Rhino and Rhino Grasshopper. Students must first get approval for the course from the instructor then present the certificate of completion. Students must also create a work based on the course and document in a Blog Posting.	5 Points Each Max 10 points

Grading Criteria	
A 90 – 100	Truly outstanding work. The work has surpassed the minimum requirements of the coursework and actively sought out and followed through on potentially risky directions on coursework. The student developed consistent approaches to problem solving and is able to articulate the reasoning behind choices and the resulting creative consequences of the choices. The student has not only mastered the technical capabilities of digital fabrication and modeling but has extended or transformed those possibilities into new forms. The student extends ideas presented in the course to ask new questions and produce new knowledge and scholarship. The student also expresses the highest levels of craftsmanship in the execution of their ideas.
B 80 – 89	Great work. The student created an entirely new object, solution, or idea. The work demonstrates clear mastery of the technical capabilities and integrates alternate, contradictory or new perspectives or ideas in an exploratory way. Creates a novel or unique idea, question, format or product. Synthesizes ideas into a coherent whole.
C 70-79	Good work. Adapts an exemplar to his or her own specifications. Considers new ideas or solutions without going beyond the guidelines of the assignment. Connects ideas or solutions in a novel way. Work is incomplete and does not exhibit the high levels of craftsmanship
D 60-69	Progressing work. Models an exemplar, successfully reproducing it. Reformulates a collection of available ideas. Acknowledges alternate or divergent ideas. Work exhibits poor craftsmanship.
F 0 – 59	Incomplete or not does meet the requirements.

Project Evaluation Standards

The following is a list of the basic criteria used to evaluate the design aspects of all your projects. You should seek to attend to all of the following in your work.

Timely Completion of Project Objectives. Work that is incomplete at the time of critique will be considered late. The student must present work at the critique to be considered "on time". Work sent to class in your absence is unacceptable unless prior arrangements have been made with the professor. Verbal presentation at the critique is a part of the grade for each project.

1) Objective
Does the work fulfill the objectives and skills to be learned as outlined in the project?

2) Originality:
Does the work go beyond the parameters of the individual assignment?

Formal Standards

1) Composition:
Is the composition structured so that it holds the viewer's interest? What natural and mechanical devices have created a sense of a complete image? Is the format (horizontal, vertical, diagonal) appropriate? Does the composition work with the surrounding space to create a holistic feeling? Does the p i e c e feel complete?

2) Scale:
Is the scale of the work and its relationship to the viewer appropriate? How is activated and negative space used to enhance the work? Is the job easy to read or lost because it's too small? How does scale affect the way the viewer engages i n the work?

3) Proportion:
Is the interplay of components in the work appropriate to one another? Does the work feel in proportion to the space it is displayed in and its relationship to the viewer?

4) Value/Color:
Are value and/or color used to enhance the work's sense of volume, form, and mass? How does the work's visual impact change in different types of light and dark? Does value or color help us to see specific visual or emotional content in the work?

5) Texture:
Does m a rk - m a ki n g enhance the quality of the work by unifying the entire work? Is the m a rk - m a ki n g appropriate to the subject matter? Does the overall patterning of the mark feel finished, developed?

3) Presentation:
Is the work professional in its appearance? Is the presentation of the work thoughtfully designed? No work will be accepted that is not finished correctly.

4) Craftsmanship:
Is the work professionally executed? Is it built with integrity and permanence? Do model files employ proper layer management?

Course Policies
Make-up exams
Makeup exams are available only to students who have a legitimate excuse for missing an exam, such as illness, scheduled job interview out of town, athletic team event out of town, death in the immediate family, etc. If you know that you must miss an exam, give a written notice to the instructor in advance, and bring documentation to support your anticipated absence.

Late Work
Late Work is not accepted. Students are expected to adhere to deadlines established in the syllabus. It is the student responsibility to complete work in a timely manner. Late and incomplete work will receive a 5 point deduction for each day that it is late. It is the student's responsibility to inform the instructor of any circumstances that may effect the timely completion of projects.

Class Attendance
All students are required to be on time and in attendance for each and every class. Two (2) absences are allowed as personal or sick leave for this semester. Students will receive one letter grade reduction for three (3) absences and an additional letter grade reduction for four (4) absences. Students who accumulate five (5) absences or more should withdrawal from the course due to five (5) absences resulting in a failing grade ("F ")

Punctuality
It is important to attend class on time. Persistent and reoccurring tardiness is disrespectful to the instructor and to your peers. Arriving to type more than 15 minutes late twice will be counted as one (1) absence. Every additional late arrival will result in one (1) absence.

*Classroom Citizenship*Cell phones and pagers must be powered off during formal class hours. Do not talk when others (the instructor, guests, and fellow students) are talking. Students will not use the computers for personal reasons (e.g, check personal email, surf web) during class time. Participate in class discussions.

Class Materials
The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation
Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords to access recorded lectures. Unless the Office of Student Accessibility has approved the student to record the instruction, students are prohibited from registering for any part of this course. Recordings may not be published, reproduced, or shared with those not in the class or uploaded to other online environments except to implement an approved Office of Student Accessibility accommodation. Failure to comply with these University requirements violates the Student Code of Conduct.

NOTE: if the instructor records any part of the course, then the instructor will need to add the following syllabus statement:

The instructor may record meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

Off-campus Instruction and Course Activities
(Below is a description of any travel and/or risk-related activity associated with this course.)

Students may be asked to Attend off campus exhibits, studio visits and performances during the course of the semester.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: "As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.
Please see http://go.utdallas.edu/academic-support-resources.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.