TEXAS A&M UNIVERSITY

Course Syllabus

Course Information

Course Number:	CSCE 743
Course Title:	Digital Fabrication Studio
Section:	600
Time:	Mon. 11:30am – 2:30pm
Location:	EABA 121 (Greenhouses) / EABC 107C (Labs & Studio)
Credit Hours:	3

Instructor Details

Instructor:	Jeeeun Kim
Office:	PETR 346
Phone:	979-862-2275
E-Mail:	Jeeeun.kim@tamu.edu
Office Hours:	1-2pm, Fridays or by appointment

Course Description

Methods to operate and design new mechanisms for digital fabrication (e.g., 3D printing, laser cutting, CNC milling); principles, models, theories, impact and prediction of behaviors in programmable materials; Emphasis on practical applications and literature on late-breaking computational fabrication in human-computer interaction for end-users; Formulation of a novel interaction techniques for fabrication through mathematical representation of machine mechanisms and material behaviors. Prerequisites: Graduate classification and approval of instructor.

Course Prerequisites

Graduate classification and approval of instructor. Students must be proficient in programming, are expected to own knowledge in WebGL and opensource project management. Javascript and node are preferred but not limited.

Special Course Designation

N/A

Course Learning Outcomes

With the focus on digital fabrication and a broad spectrum of technical Human-Computer Interaction, students successfully completed the course will be able to build their knowledge and abilities to:

- Name and described differences in additive and subtractive digital fabrication methods (e.g. laser cutting, 3D printing, CNC machining, physical computing), their fundamental principles, effects of changing processing parameters in fabrication results

- Enumerate various materials that are available for consumer-grade digital fabrication systems, evaluate smart materials that are responsive to ambient stimuli
- Operate and trouble-shoot major digital fabrication machines with computational fine-tuning of processing parameters (e.g., raster angle, nozzle power, nozzle speed)
- Program material behaviors through design of artifacts (e.g., 3D printed and/or. Laser-cut)
- Prototype smart interactive devices that are capable of sensing and actuating dynamically using late-breaking digital fabrication techniques
- Program machine instructions (i.e., G-code) to direct control the machine mechanisms.

Textbook and/or Resource Materials

No textbook required. All materials will be posted on the class website. Machines, utilities, materials, and supplies (e.g., 3D printers, special filaments, conductive threads) will be provided. Students are recommended to invest extra materials and supplies that are essential for their final projects.

Grading Policy

- Participation (Attendance & In-class participation): 10%
- Assignments + In-studio activities (Mainly individual if not specified, can work as a group of two if preferred but needs the instructor's approval): 20%
- Midterm project (Group, replicating an existing project settings): 30%
- Final project** (Group, developing a novel assistive robotic device): 30%
- Reflection, Survey & Review paper (Individual writing about the chosen topic): 10%
- No written exam, no quiz

Total: 100%

****Final Project grading**

- Concept (30%)
  - Topic appropriateness and scope (10%)
  - Motivation (10%)
  - Related work research (10%)
- Production & Milestone (40%)
- Delivery (documentation) & Report (20%)
- Individual contribution, evaluated by peers (10%)

Grading Scale

90% <= A
80% <= B < 90%
70% <= C < 80%
60% <= D < 70%
F = <60%

Late Work Policy

Extensions/make-ups can be given 12 hours prior to the deadline upon written/in-person request. 20min will be given as a grace period. Otherwise, 50% off from the credit you got for that submission.

Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy (Student Rule 7).

Course Schedule

Course schedule is as the following (course topics are provisional, subject to change upon progress)
All assignments are due at 11:59PM by the Sunday of the same week, unless specified.

Week	Class Type	Topic	Assignment
1 (8/25)	Lecture	Course Intro: What's Digital Fabrication and Why? EABC 107C Lab Tour Warm-up exercise: paper pinhole camera	Photo/video of pinhole camera 5 ideas for project
2 (9/1)		**Labor day; No class**	
3 (9/8)	Lecture + Lab	Metamaterials	3D printed metamaterial device
4 (9/15)	Lecture	Direct machine control using G-code	Modified G-code for LumosX
5 (9/22)	Studio	3D printed passive sensors, information display	3D printed dynamic information display
6 (9/29)		**Midterm Presentation;** Instructor is out for UIST'25	**Video Submission**
7 (10/6)	Lecture + Lab	Fabricating Energy Harvesters	Vibration energy harvestor
- (10/13)		**Fall Break; No class**	
8 (10/20)	Lecture	Deconstruction Aware Fabrication: Sustainability	Project milestone 1
9 (10/27)	Studio	Augmenting Everyday Objects with 3D Printed Attachments	
10 (11/3)	Lecture	Smart Materials for FDM Printing with Digital Capabilities	Project milestone 2
11 (11/10)	Studio	**Final project interim and feedback***	
12 (11/17)	Lecture	Programming custom material properties for FDM	Project milestone 3
13 (11/24)	Studio	Work on your project	
14 (12/1)	Studio	Work on your project	

15	Studio	**Final Presentation**	Project milestone 4

*Students attend the class, meet with the instructor individually, other teams work on final projects

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

College and Department Policies

College and departmental units may establish their own policies and minimum syllabus requirements. As long as these policies and requirements do not contradict the university level requirements, colleges and departments can add them in this section. Please remove this section if not needed.