

Syllabus

Course Information

Course Number: CSCE 748

Course Title: Computational Photography

Time: MWF 3:00 – 3:50 pm

Location: CHEN 102

Credit Hours: 3

Class Website: <https://people.engr.tamu.edu/nimak/Courses/CompPhoto/Spring2024/>

Campuswire Link: <https://campuswire.com/p/G9F05997B> (access code: 9065)

Instructor Details

Instructor: Nima Kalantari

Office: 406 in PETR

Phone: (979) 862-4251

E-Mail: nimak@tamu.edu

Office Hours: MW 4:10 – 5:10 pm

TA Details

Name: Libing Zeng

Location: Peterson 402

E-Mail: libingzeng@tamu.edu

Office Hours: TR 2:00 – 4:00 pm

Course Description

Cameras and the image formation process; basic image and video processing tools like sampling, filtering, and pyramids; several image-based algorithms, including panorama creation, light fields, image retargeting, high dynamic range imaging, and texture synthesis.

Course Prerequisites

Graduate classification or approval of course instructor.

Special Course Designation

N/A

Course Learning Outcomes

Upon finishing this class, students should be able to:

- Explain the foundation of image formation and relationship between 3D world and 2D images
- Identify and assess various necessary image processing tools for computational photography
- Critically analyze the details of several image-based algorithms
- Implement different computational algorithms for image and video manipulation

- Independently read and implement papers related to computational photography

Textbook and/or Resource Materials

The primary reference of the course is the following book, which covers most of the topics related to computational photography:

Computer Vision: Algorithms and Applications, by Richard Szeliski, 2010

Web-based offering will have course related materials online.

Grading Policy

Programming Assignments (65%): There will be 6 programming assignments for this course. All the assignments are going to be in MATLAB or Python.

For some assignments extra tasks are designed. Getting 50 bonus points from these extra tasks is necessary for receiving the full mark.

Midterm Exam (15%): There would be a midterm exam on March 25th during class.

Final Project (20%): Students are free to choose any project related to computational photography. They can work individually or in teams of up to 3 students. The team members should all be either graduate or undergraduate students (mixing is not allowed). Students will propose the project at the middle of the semester. The final project report will be due on May 2nd.

Grading Scale → A = 90-100, B <90 and >=80, C <80 and >=70, D <70 and >=60, F <60

Late Work Policy

You will lose 20% from each assignment for each day that it is late. However, there will be 5 granted late days for the entire course. The late days can be used all at once on a single assignment or used on multiple assignments. The late days, however, cannot be used for the final project. All the assignments are due at 11:59 pm. Note that, one minute over and 23 hours over both count as one full day.

Course Schedule

1-2	Cameras and Image Formation	Szeliski Ch 1 & 2	Hw 1 out & HW 1 due
3-4	Image Processing Tools	Szeliski Ch 3	Hw 2 out & HW 2 due & HW 3 out
5	Blending and Compositing	Szeliski Ch 9	Hw 3 due & HW 4 out
6-7	Homographies, Alignment, and Panoramas	Szeliski Ch 4 & 6 & 9	Hw 4 due
8	Stereo	Szeliski Ch 11	
9	Light fields	Szeliski Ch 13	Midterm
10	Image Retargeting	Avidan and Shamir 2007; Simakov et al. 2008	Hw 5 out
11-12	High Dynamic Range Imaging	Szeliski Ch 10	Hw 5 due & Hw 6 out

13-14	Texture synthesis	Szeliski Ch 9 & 10 & 13	Hw 6 due
15	Deblurring and Coded Photography	Raskar et al. 2006, Levin et al. 2007	Final project

Optional Course Information Items

N/A

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."

The assignments in this class are individual unless otherwise stated. For the individual assignments, all the codes need to be written by the student. If indicated in the assignment's instruction, the use of external libraries for performing basic operations is allowed. However, using an outside source code is NOT permitted. Note that the use of large language models like ChatGPT is considered an outside source and is NOT allowed. Moreover, collaborating with other students on assignments beyond general

discussions is NOT allowed. In general, looking at other students' code and/or written answers is NOT allowed. Posting the code on publicly available websites (e.g., GitHub), even after the assignment deadline, is NOT allowed. If the students have any questions regarding this issue, they should contact the instructor. The students should not post their code online even after the deadline for the assignment has passed.

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

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 the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can 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.