Course Syllabus

Course Information

Course Number/Section	CS 4391.001
Course Title	Introduction to Computer Vision
Term	Spring 2024
Class Level	Undergraduate
Activity Type	Lecture
Days & Times	Tuesday & Thursday 11:30 AM – 12:45 PM
Location	JO 4.102
Course Modality	Face-to-Face
Credit Hours	3

Professor Information

Instructor	Prof. Yu Xiang, Ph.D.
Office Phone	(972) 883-3891
Email Address	yu.xiang@utdallas.edu
Office Location	ECSS 4.702
Office Hours	Tuesday & Thursday 2:00PM – 3:00PM

Teaching Assistant Information

Teaching Assistant	Jishnu P
Email Address	Jishnu.P@UTDallas.edu
Office Location	ECSS 4.222
Office Hours	Monday 12:00PM – 1:00PM

Course Pre-requisites, Co-requisites, and/or Other Restrictions

CS3345 - Data Structures and Introduction to Algorithmic Analysis

Course Description

Theory and practice of computer vision. Provides in-depth overview of computer vision, including geometric primitives and transformations, camera models, image features, epipolar geometry and stereo, structure from motion and SLAM, 3D reconstruction, variations of modern neural networks and various recognition problems such as object detection, semantic segmentation, and human pose estimation.

Student Learning Objectives/Outcomes

- Ability to understand geometric primitives and transformations
- Ability to understand projective geometry in camera models
- Ability to understand keypoint-based image features
- Ability to apply methods for camera calibration and camera pose estimation
- Ability to understand epipolar geometry, structure from motion and 3D reconstruction techniques
- Ability to understand principles and architectures of modern neural networks
- Ability to develop methods for various recognition problems from images and videos

Required Textbooks and Materials

2. Computer Vision: Algorithms and Applications. 2011th Edition. Springer.
ISBN-13: 978-1848829343
ISBN-10: 1848829345

David Forsyth, Jean Ponce. Computer Vision: A Modern Approach, 2nd Edition. Pearson, 2011. (Optional)
ISBN: 9789332550117

Richard Hartley. Multiple View Geometry in Computer Vision, 2nd Edition. Cambridge University Press, 2004. (Optional)
ISBN-13: 978-0521540513
ISBN-10: 0521540518

Textbooks and some other bookstore materials can be ordered online or purchased at the UT Dallas Bookstore.

Technical Requirements
In addition to a confident level of computer and Internet literacy, certain minimum technical requirements must be met to enable a successful learning experience. Please review the important technical requirements on the Getting Started with eLearning webpage.

Course Access and Navigation
This course can be accessed using your UT Dallas NetID account on the eLearning website. Please see the course access and navigation section of the Getting Started with eLearning webpage for more information.

To become familiar with the eLearning tool, please see the Student eLearning Tutorials webpage. UT Dallas provides eLearning technical support 24 hours a day, 7 days a week. The eLearning Support Center includes a toll-free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service.

Communication
This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and a web conferencing tool may also be used during the semester. For more details, please visit the Student eLearning Tutorials webpage for video demonstrations on eLearning tools.

Distance Learning Student Resources
Online students have access to resources including the McDermott Library, Academic Advising, The Office of Student AccessAbility, and many others. Please see the eLearning Current Students webpage for more information.

Server Unavailability or Other Technical Difficulties
The University is committed to providing a reliable learning management system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and also contact the online eLearning Help Desk. The instructor and the eLearning Help Desk will work with the student to resolve any issues at the earliest possible time.

Grading Policy

Credit Distribution

- Homework (50%)
  - (10%) Homework #1
  - (10%) Homework #2
  - (10%) Homework #3
  - (10%) Homework #4
  - (10%) Homework #5
- Midterm Exam (20%)
- Final Exam (25%)
- In-Class Activity (5%)

Final Grading Scale

- A 93 or above
- A- 90-93
- B+ 87-90
- B 83-87
- B- 80-83
- C+ 77-80
- C 70-77
- D+ 67-70
- D 60-67
- F 60 or below

Midterm Grading Scale

- A 18 or above
- A- 16 - 18
- B+ 14 - 16
- B 12 – 14
- B- 10 – 12
- C+ 8 - 10
- C 6 – 8
- D+ 4 - 6
- D 2 – 4
- F 2 or below

Homework Late Policy

- Assignments turned in within 24 hours of the due date will receive 90% of its score. Assignments turned in within 48 hours of the due date will receive 70% of its score. Assignments more than 48 hours late will not be accepted.

Course Policies

- eLearning is the official information portal for this course. Course announcements, homework, lecture slides, assignments, and grades will be communicated via eLearning
- Final course grade will be posted in Galaxy by the Records Office
- Attendance:

    - Required for mandatory class sessions. There will be 1-point deduction for each mandatory class absence in Team Project participation score (5%). There will be zero point for class participation if the number of absences is three or more.
- If you decide to stop attending class, be sure to drop or withdraw from the course. Otherwise, you risk receiving an 'F' or 'NF' for the course.
- No additional individual assignments can be assigned for extra credit. Only assignments that are available to the entire class may count toward the course grade.

UT Dallas Syllabus Policies and Procedures

Please visit http://go.utdalls.edu/syllabus-policies for other policies

Schedule

Week	Tuesday	Thursday	Deadlines
1	1/16 Cancelled due to weather condition	1/18 Introduction to Computer Vision	
2	1/23 Intensity Surface and Gradients	1/25 Linear Operators and Convolution	HW1 release on 1/25, due 2/1 at 11:59PM CT
3	1/30 Smoothing	2/1 Cancelled due to traveling	
4	2/6 Edge Detection	2/8 Corner Detection	HW2 release on 2/8, due 2/15 at 11:59PM CT
5	2/13 Laplacian and Blob Detection	2/15 SIFT I	
6	2/20 SIFT II	2/22 Geometric Primitives and Transformations	HW3 release on 2/22, due 2/29 at 11:59PM CT
7	2/27 Camera Projection	2/29 Camera Calibration	
8	3/5 Epipolar Geometry	3/7 Midterm Exam	
9	3/12 Spring Break	3/14 Spring Break	
10	3/19 Epipolar Geometry and Stereo	3/21 Structure from Motion I	
11	3/26 Structure from Motion II	3/28 Convolution Neural Networks I	HW4 release on 3/28, due 4/4 at 11:59PM CT
12	4/2 Convolution Neural Networks II	4/4 Convolution Neural Networks III	

13	4/9 Recurrent Neural Networks I	4/11 Recurrent Neural Networks II	
14	4/16 Transformer I	4/18 Transformer II	HW5 release on 4/18, due 4/25 at 11:59PM CT
15	4/23 Object Detection I	4/25 Object Detection II	
16	4/30 Semantic Segmentation	5/2 Final Exam	

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