

## Syllabus

### CSE 6367 Computer Vision Spring 2017

<b>Instructor:</b>	Farhad Kamangar
<b>Office Location:</b>	ERB 524
<b>Office Telephone:</b>	817-272-3617
<b>Email Address:</b>	kamangar@uta.edu
<b>Office Hours:</b>	Wed. 5:00-7:00 PM
<b>Section Information:</b>	CSE-6367 Section 001
<b>Time and Place of Class:</b>	Wed. 7:00-10:00 PM , ERB 131
<b>Course Website:</b>	<a href="http://ranger.uta.edu/~kamangar/Courses/CSE_6367_SP17">http://ranger.uta.edu/~kamangar/Courses/CSE_6367_SP17</a>

**Teaching assistant (GTA):** Mohsen Kheirandishfard

**E-mail:** mohsen.kheirandishfard@mavs.uta.edu

**Office:** ERB 552

**Office hours:** Tues. and Thurs. 3:00-5:00 PM.

#### Description of Course Content:

Advanced techniques for interpretation, analysis, and classification of digital images. Topics include methods for segmentation, feature extraction, recognition, stereo vision, 3-D modeling, and analysis of time-varying imagery. Also taught as EE 6358. Prerequisite: CSE 5301 or CSE 5360 or EE 5356 or EE 5357, and consent of instructor.

#### Student Learning Outcomes:

The objective of this course is to provide the fundamental theory, applications, and techniques of computer and machine vision. This course will discuss different levels of computer vision from early image formation to the high level object recognition and scene analysis. Having successfully completed this course, students will understand the principals and techniques for extracting information from digital images and will be able to design and implement high level computer vision applications such as face recognition, stereo vision, and motion tracking.

#### Textbooks:

[Computer Vision: Algorithms and Applications, Richard Szeliski](#)

#### Course Schedule and Important Dates

- First day of class: Jan. 17, 2017
- Census day: Feb. 1, 2017

- Spring Vacation: Mar. 13 - Mar. 18, 2017
- Last day to drop classes: Mar. 31, 2017
- Last day of classes: May 5, 2017

### **Descriptions of major assignments and examinations:**

- There will be programming assignments. All assignments must be submitted using the Blackboard online system.
- There will also be a semester project. Project topic(s) and guidance will be provided during the semester.
- There will be in-class quizzes. Quizzes will be comprehensive and consist of occasional, unannounced, written questions which will be based on the assigned readings and class lectures. The quiz policy may be adjusted in the case of documented disability.
- Grades will be calculated based on the following percentages:

Quizzes	25%
Assignments	50%
Projects	25%

### **Assignments and Projects Policies:**

- All assignments and projects are due at 11:59 PM on the specified date.
- If you miss an assignment deadline because of an unexpected event, you may use a one-time 24 hour grace period to submit a late assignment. Your late submission will not be penalized. Please note that you can only use this grace period ONE TIME during the semester.
- No late assignments shall be accepted (if you already used the grace period).
- Assignments must be submitted electronically using the Blackboard at <https://elearn.uta.edu>.
- The supported programming language to be used for this class will be Python 3.4.
- Each assignment or project must compile and run properly without errors. The teaching assistant will only use the submitted files. In other words, your assignments must run as submitted.
- Programs that do not run will receive no credit (No partial credits).
- Programs that implement some, but not all, of the requirements may receive partial credit. However, these programs must still run without errors.
- It is each student's responsibility to completely test their program PRIOR to submission and make sure that it executes without error(s)

## **Attendance**

- At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will not take attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

## **General Policies:**

- Your opinion matters and all constructive suggestions will be seriously considered. However, your suggestions should be applicable to all students in the class and not to a particular individual or group of students. Please do not ask for any exception.
- Please turn off your cell phone during the class.
- If you bring a notebook (laptop, pad, ...) to class it should ONLY be used for work which is related to the ongoing subject in this class. DO NOT use your computer for anything which is not related to this class such as email, social networks, games, chat, or work related to other courses.
- There will be no makeup quizzes. If, and only if, you have an approved medical or university excuse for being absent from a test, the next scheduled exam shall count twice.
- Please do not be late in attending the class. Your late arrival will disturb the continuity of the subject and may break other student's concentration.
- You are responsible for all material presented during classes from which you were absent.

## **Incomplete Grade Policy:**

- No special make-up work will be accepted after the end of the semester. In the event of a documented major medical problem with a university approved letter, a grade of Incomplete will be given pending the submission of complete work. However, make-up work "to improve one's grade" will not be accepted.

## **Drop Policy:**

- Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/ses/fao> ).

### **Grade Grievances:**

- Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog. [http://www.uta.edu/catalog/content/general/academic\\_regulations.aspx#10](http://www.uta.edu/catalog/content/general/academic_regulations.aspx#10)

### **Americans with Disabilities Act:**

- The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

### **Academic Integrity:**

All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

Instructors may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

All students are expected to pursue their academic careers with honesty and integrity. "Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts" (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22.). Students found guilty of dishonesty in their academic pursuits are subject to penalties that may include suspension from the university. Any student found guilty of academic dishonesty will receive a **-100%** for that work (assignment, project, etc.) as well as having the course grade lowered **one full letter grade** - in addition to any other penalties assessed (suspension, expulsion, probation). These and other applying UTA rules, will be strictly enforced. Any case of academic dishonesty will be treated in accordance with the UTA Handbook of Operating Procedures or the Judicial Affairs website at <http://www2.uta.edu/discipline>. If you do not understand this policy, it is your responsibility to obtain clarification or any additional information you may require. Students are not allowed to:

- Collaborate with others on the code they write
- Copy any part of someone else's program, even if they have permission and/or have modified the code
- Share or give their code, or even a subset of the code to, another student
- Review another student's solution (including from past semesters)

All work turned in for grading must be the student's own work.

### **Student Support Services:**

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and

mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

### **Electronic Communication:**

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

### **Student Feedback Survey:**

At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

### **Final Review Week:**

A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

### **Course Topics:**

- Introduction to computer vision and Python, Numpy, scipy, and opencv
- Image formation, image representation

- Elementary image operations, linear filters
- Edge and corner detection
- Neighborhood operators
- Frequency domain operations
- Geometric transformation and warping
- Stereo vision, and epipolar geometry
- Feature detection
- Feature matching
- Invariant features
- Rectangle filters, weak classifiers, AdaBoost
- Segmentation
- Active contours
- Object Recognition
- Face recognition
- Bag-of-words
- Model-based recognition
- Shape matching
- PCA
- Optical flow
- Motion detection and tracking