جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Intoduction to Computer Vision - EE 354

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 354
Course Title	Intoduction to Computer Vision
Academic Semester	Spring
Academic Year	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	09:00 AM - 10:30 AM | Mon Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Bernard Semaan Ghanem	Bernard.Ghanem@kaust.edu.sa	+966128080261	2125, 1, Al-Khawarizmi (bldg. 1)	TBD

Teaching Assistant(s)

Name	Email
TBD	TBD

Course Information

Comprehensive Course Description	This course gives an introductory overview of concepts (e.g. photometric and multi-view stereoscopy, epipolar geometry, interest point detection and description), problems (e.g. image-to-image matching and alignment, image classification, clustering/segmentation, face recognition), and methodology (e.g. linear/nonlinear image filtering, RANSAC for robust fitting, discriminative and generative models) in the field of computer vision. It is intended to provide a solid background for students, who are planning to do research in visual computing.
Course Description from Program Guide	This course gives an introductory overview of concepts (e.g. photometric and multi-view stereoscopy, epipolar geometry, interest point detection and description), problems (e.g. image-to-image matching and alignment, image classification, clustering/segmentation, face recognition), and methodology (e.g. linear/nonlinear image filtering, RANSAC for robust fitting, discriminative and generative models) in the field of computer vision. It is intended to provide a solid background for students, who are planning to do research in visual computing.
Goals and Objectives	At the end of this course, students should: -be able to identify what aspect of computer vision (low-level, mid-level, and/or high-level) should be focused on when a particular research question is faced. -understand how to evaluate the feasiblity and performance of solutions proposed for certain computer vision problems. -understand the computational details behind the numerical methods discussed in class, when they apply, and what their pros/cons are. -be able to implement the numerical methods discussed in class and verify their theoretical properties in practice. -be able to apply the learned techniques and analysis tools to problems arising in their own research.
Required Knowledge	Prerequisites include multivariate calculus, elementary real analysis, and linear algebra.

Reference Texts	Required Textbook: -*Computer Vision: A Modern Approach*, D. Forsyth and J. Ponce, Prentice Hall, 2nd Edition
Method of evaluation	**30.00**% - Homework /Assignments **70.00**% - Course Project(s)
Nature of the assignments	**Homework** There will be a homework assignment every month, which includes programming problems. The handed-in assignment will be corrected in a timely manner and solutions will be provided by the instructor thereafter. It is expected that each student does his/her own assignment individually. Copying homeworks is not tolerated and will be dealt with accordingly. **Project** The course project gives each student the opportunity to apply the concepts and methods taught in class (and from research papers) to a vision problem of their choice. They choose the project topic at the beginning of the semester. Each student will propose their own project, upon the consent of the instructor. If a student cannot come up with a feasible topic for their project, the instructor will propose one for him/her.
Course Policies	All homework assignments are required. If you dispute your grade on any homework, you may request a re-grade from the instructor only within 48 hours of receiving the graded exam. Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these extraordinary circumstances must be verifiable. The assignment of an (I) requires first an approval of the dean and then a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Mon 01/28/2019 Wed 01/30/2019	Introduction
2	Mon 02/04/2019 Wed 02/06/2019	Early Vision: Light and Color
3	Mon 02/11/2019 Wed 02/13/2019	Early Vision: Image Formation
4	Mon 02/18/2019 Wed 02/20/2019	Early Vision: Linear and Nonlinear Filtering
5	Mon 02/25/2019 Wed 02/27/2019	Early Vision: Edges, Interest Points, Corners and Descriptors
6	Mon 03/04/2019 Wed 03/06/2019	Photogrammetry: Camera Model and Calibration
7	Mon 03/11/2019 Wed 03/13/2019	Photogrammetry: Epipolar Geometry and Photometric Stereo
8	Mon 03/18/2019 Wed 03/20/2019	Photogrammetry: Structure from Motion and SLAM
9	Mon 03/25/2019 Wed 03/27/2019	Photogrammetry: Structure from Motion and SLAM
10	Mon 04/01/2019 Wed 04/03/2019	Mid-level Vision: Clustering
11	Mon 04/08/2019 Wed 04/10/2019	Mid-level Vision: Segmentation
12	Mon 04/15/2019 Wed 04/17/2019	Mid-level Vision: Segmentation
13	Mon 04/22/2019 Wed 04/24/2019	High-level Vision: Object Recognition
14	Mon 04/29/2019 Wed 05/01/2019	High-level Vision: Object Detection
15	Mon 05/06/2019 Wed 05/08/2019	High-level Vision: Visual Object Tracking
16	Mon 05/13/2019 Wed 05/15/2019	High-level Vision: Deep Learning
17	Mon 05/20/2019 Wed 05/22/2019	Project Presentations

Note

The instructor reserves the right to make changes to this syllabus as necessary.