**Sabanci University**
**Computer Engineering Department**
**CS 518 Computer Vision**
**2022-2023 Fall**

| Section | Instructor | Lectures | Office Hours |
|---|---|---|---|
| | Erchan Aptoula | Monday 13.40-14.30 | Tuesday 11.00-12.00 |
| | | Tuesday 08.40-10.30 | Tuesday 14.00-15.00 |

| Week | Subject |
|---|---|
| 1 | Introduction, filtering |
| 2 | Image pyramids and the frequency domain |
| 3 | Hough transform |
| 4 | Corner detection |
| 5 | Feature detectors and descriptors |
| 6 | 2D transformations – warping |
| 7 | Image homographies |
| 8 | Geometric camera models |
| 9 | Two-view geometry and stereo |
| 10 | Image classification |
| 11 | Learning based computer vision |
| 12 | Optical flow and tracking |
| 13 | Applications and case studies: remote sensing, medical image analysis |
| 14 | Student presentations |

The above schedule is tentative and subject to change.

This course provides a comprehensive introduction to computer vision. Major topics include image processing, detection and recognition, geometry-based and learning-based vision and video analysis. Students will learn basic concepts of computer vision as well as hands-on experience to solve real-life vision problems.

**Textbooks**

- Computer Vision: Algorithms and Applications by Richard Szeliski
- Computer Vision: A Modern Approach (Second Edition) by David Forsyth and Jean Ponce
- Multiple View Geometry in Computer Vision (Second Edition) by Richard Hartley and Andrew Zisserman
- Digital Image Processing, by Rafael Gonzalez and Richard Woods

**Prerequisites:** Python programming, calculus, linear algebra, elementary probability and statistics.

**Evaluation**

- **Homeworks (3 - 15% each)** will require implementing one or more computer vision algorithms and/or the design and implementation of a computer vision processing pipeline. They may also include theoretical questions to be answered via LaTeX.
- **Final exam 35%** will take place in class, in the form of theoretical/design questions, and cover all the topics of the semester.
- **Paper presentation (15%)** will require the oral presentation of a recently published scientific article relevant to the course, selected by the students (group work is possible) and approved by the instructor.
- **Class participation (5%)**

**Grading**

| A+ | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | D- | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ≥95% | ≥90% | ≥85% | ≥80% | ≥75% | ≥70% | ≥65% | ≥60% | ≥55% | ≥50% | ≥45% | ≥40% | <40% |

A curve might be applied depending on the distribution, however it will not be stricter than the above scheme.

**Late policy**

- Late days will incur a 10% penalty/day.