

Sabanci University
Computer Engineering Department
CS 419 Digital Image and Video Analysis
2024-2025 Fall

| Instructor | Lectures | Office Hours |
|--------------------|---|-----------------------|
| Erchan Aptoula | Wednesday 08.40 - 09.30 FENS L045 | Wednesday 15.40-16.30 |
| | Thursday 08.40 - 10.30 FASS G062 | |
| Teaching assistant | | |
| Efkan Duraklı | https://sabanciuniv.zoom.us/j/8070222601 | Wednesday 13.00-14.00 |

Tentative schedule

| Week | Subject |
|------|---|
| 1 | Digital image acquisition, sampling & quantization |
| 2 | Point processing, histogram processing and matching |
| 3 | Binary image analysis: adjacency, connected components, binary morphology |
| 4 | Spatial image enhancement: filtering, smoothing, sharpening |
| 5 | Image enhancement in the frequency domain: low-pass, high-pass filters, the convolution theorem |
| 6 | Non-linear filtering, grayscale morphological processing |
| 7 | Color image processing: color perception, color spaces, basic operations, color filtering |
| 8 | Image segmentation |
| 9 | Content description: color |
| 10 | Content description: shape |
| 11 | Content description: texture |
| 12 | Local content description and bag of words |
| 13 | Student presentations |
| 14 | Video processing |

This course provides a comprehensive introduction into digital image & video processing and analysis. Major topics include image acquisition, linear and non-linear filtering, color, content description and video analysis. Students will learn the basic concepts of image and video processing as well as acquire hands-on experience in solving real-life visual analysis problems.

Textbooks

- Gonzales and Woods, Digital Image Processing, 4th Ed, 2017
- W. Pratt, Digital Image Processing, 4th Ed.
- P. Soille, Morphological Image Analysis, 2004
- R. Szeliski, Computer Vision and Applications, 2010

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

Evaluation

- **Take home assignments (5 of them, 50%):** will require implementing image and video processing solutions in python. They might also involve theoretical questions and proofs.
- **Final exam (40%):** will take place in the classroom, with no coding, and will involve mostly design, calculation, and critical thinking questions.
- **Group presentation (10%):** (Groups of at most 5 students) You will make a short presentation about an article published in a prestigious image processing journal and answer questions.

Makeup exam

- Will be organized only for students with medical reports or other significant excuses.

Late submission policy

- You'll have in total four late days with no penalties. That's 4 in total, not per assignment. You can use them for any reason, without notifying the instructor or the teaching assistant. Every assignment will be submissible for at most 72 hours past its deadline. Every 24 hours that the submission is late, will incur an additional 15% penalty on your grade.