Code: 02-2-04

COMPUTER-ASSISTED IMAGE PROCESSING AND ANALYSIS

ECTS: 5

Course coordinator: Prof. Dr. Franjo Pernuš

Lecturers: Prof. Dr. Franjo Pernuš, Prof. Dr. Boštjan Likar

No. of hours: 125  Lectures: 10  Seminar: /
Lab. work: 20   Other: 95

2. Entry requirements:
General conditions for enrolment in doctoral studies.

3. Objectives of the course and intended learning outcomes:
(competences)
Educational objectives:
To provide an introduction to computer-assisted image processing and analysis; to
develop basic understanding of digital image processing, restoration, calibration and
quantitative analysis; and to develop understanding of image processing and
analysis methods, which enable objective and quantitative evaluation of the
environment, space, objects and subjects in bioengineering.
Learning outcomes:
Students completing this course will gain a fundamental understanding of computer-
assisted image processing and analysis; gain hands-on knowledge of applications of
image processing and analysis and be able to apply existing image processing
algorithms to analyse images from the field of biosciences.

4. Syllabus outline:
Image processing:
Modelling and estimating noise, image blurring, sharpening and filtering,
morphological and color image processing, calibration and restoration of intensities
and shading, geometric calibration, image registration and integration.
Image analysis:
Thresholding, edge based segmentation, region growing, merging and splitting,
model based description, object representation and counting, border and region
description and measurement, growth and motion analysis.
Image processing and analysis applications:
Software tools for image processing and analysis and their use for objective
quantitative evaluation of the environment, space, objects and subjects in various
bioengineering fields, such as microscopic image analysis, food quality control,
growth and motion analysis of animals, plants and microorganisms, etc.

5. Literature (in the case of books and monographs, study sources are only
selected chapters from them):
- Boštjan Likar. Biomedicinska slikovna informatika in diagnostika, 1. izdaja,
6. Teaching methods:
Basic theory and subject overview is addressed by lectures, while practical knowledge and experience are gained through lab work and projects or seminars, which are selected by the students to best match their specific interests.

7. Assessment methods:
A student prepares and publicly presents a project or seminar, the final mark is formed according to the content and presentation quality.

8. References:

Pernuš Franjo

Likar Boštjan