Digital Image Processing, 4 credits

Digital Bildbehandling, 4 hp

Course Code/Codes	50DT044
Subject Area	Computer Science (Datavetenskap)
School/equivalent	School of Science and Technology (Institutionen för naturvetenskap och teknik
Valid from	2016-12-15
Approved	2016-12-15
Revised	,
Approved by	Head of School Peter Johansson
Translation to English, date and signature	, ,

1   Course content

This course introduces and discusses the following topics in digital image processing:
-   Spatial Filtering
-   Bilateral Filtering
-   Fourier Domain/Image Restoration
-   Color Image Processing
-   Morphological Image Processing
-   Image Segmentation

2   Outcomes

2.1   The course in relation to the doctoral programme

The course shall primarily refer to the following intended learning outcomes for third-cycle courses and study programmes as described in the Higher Education Ordinance, i.e. the doctoral student shall demonstrate:

Knowledge and understanding
-   broad knowledge and systematic understanding of the research field (part of outcome 1)
-   familiarity with the methods of the specific field of research in particular (part of outcome 2)

Competence and skills
-   the ability to review and evaluate research and other qualified tasks (part of outcome 4)
-   the capacity to support the learning of others (part of outcome 8)

The intended learning outcomes are listed in the same order as in the general syllabus for the programme.

2.2 Intended course learning outcomes

To obtain a passing grade, the doctoral student shall demonstrate:

- An understanding of the variety of image processing techniques introduced during the lectures. (This relates to learning outcome 1)

  - The ability to apply these image processing techniques and to decide which of a set of possible approaches is most suitable for a given task. (This relates to learning outcomes 1 and 8)

    The ability to reproduce approaches described in contemporary scientific literature and to read and critically review research papers. (This relates to learning outcomes 2, 4 and 8)

3   Reading list and other teaching material

The following course readings and teaching material will be used on the course:

Gonzalez, Rafael and Woods, Richard E (latest edition)
Digital Image Processing
Pearson

Gonzalez, Rafael and Woods, Richard E (latest edition)
Digital Image Processing Using Matlab
Pearson

Joseph Bigun (latest edition)
Vision with Direction: A Systematic Introduction to Image Processing and Computer Vision
Springer

Additional material (current research papers) will be distributed during the course. Due to the quickly advancing field, a new list of relevant papers will be selected each year.

4   Teaching formats

Teaching on the course takes the following format:

Lectures, assignments and seminars.

5   Examination

The course is assessed through an examination consisting of the components listed below. The individual components are not graded separately but together they provide the basis for assessment and grading.

Assignments
During the course, exercises are assigned that cover practical aspects of the course. Students work in groups of two people (in case of an uneven number of students, one three person group is formed) to address these assignments. The corresponding tasks are directly relevant to the objectives and often include application of the techniques introduced during the lectures.

Seminars

Students can select from a pool of papers that they are supposed to present and critically discuss in a seminar. These presentations are individual.

For examinations consisting of several examination components, the following applies: If during the course it is concluded that a doctoral student is unable to complete a certain examination component, the examiner may set a substitute assignment provided that circumstances do not reasonably allow for the course component to be completed at a later date during the run of the course.

6   Grades

Examinations on third-cycle courses and study programmes are to be assessed according to a two-grade scale with either of the grades 'fail' or 'pass' (local regulations).

The grade shall be determined by a teacher specifically nominated by the higher education institution (the examiner) (Higher Education Ordinance).

To obtain a passing grade on examinations included in the course, the doctoral student is required to demonstrate that he/she attains the intended course learning outcomes as described in section 2.2. Alternatively, if the course consists of multiple examinations generating credit, the doctoral student is required to demonstrate that he/she attains the outcomes that the examination in question refers to in accordance with section 5.

A student who has failed an examination is entitled to a retake.

If an examination consists of several examination components, and a student fails an examination component, the examiner may, as an alternative to a retake, set a make-up assignment with regard to the examination component in question.

A doctoral student who has failed an examination twice for a specific course or course element is entitled, upon his/her request, to have another examiner appointed to determine the grade.

7   Admission to the course

7.1   Admission requirements

To gain access to the course and complete the examinations included in the course, the applicant must be admitted to a doctoral programme at Örebro University.

7.2   Selection

Selection between applicants who have been admitted to doctoral programmes at Örebro University and who otherwise meet the admission requirements as listed above is made according to the following order of precedence:

If no other selection criteria are specified in this section, priority shall be given to applicants with a lower number of course credits left before the award of their degree over applicants with a higher number of remaining course credits. Should two or more students have equal number of credits, selection will be done through the drawing of lots. This also applies within any selection groups listed unless otherwise stated.

7.3   Other applicants than doctoral students admitted at Örebro University

Other applicants than doctoral students admitted at Örebro University may be given access to the course on the grounds of provisions for and/or agreements regarding contracted courses, joint degrees, national graduate schools or cooperation in other respects with other universities.

Any decisions on what such other applicants may be given access to the course are made separately and on the basis of the provisions and/or agreements that occasion the student to apply for the course.

For participation in the course in other respects, the same provisions shall apply as for doctoral students admitted to Örebro University.

8   Transfer of credits for courses, study programmes and other experience

Provisions on the transfer of credits can be found in the Higher Education Ordinance and on the university's webpage.

9   Other information

The course is given in English.

Transitional provisions

None.