ÖREBRO UNIVERSITET

Course syllabus
Third-cycle courses and study programmes

Probabilistic Localisation and Mapping, 4 credits

Probabilistisk lokalisering och kartering, 4 hp

Course Code/Codes	50DT049
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

The course covers the following contents in the context of probabilistic localisation and mapping:
- Bayes filtering
- Kalman filters
- Particle filters
- Monte Carlo optimisation
- Robot motion and sensor models
- SLAM (simultaneous localisation and mapping)
- Data association

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
- advanced and up-to-date specialised knowledge in a limited area of this 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)

Judgement and approach

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:

- Familiarity with parametric and nonparametric probabilistic state estimation in applications of localisation and mapping,
- Advanced knowledge of up-to-date localisation and mapping literature, including robust graph optimisation techniques,
- A professional capacity to autonomously review and critically assess current literature, including the ability to maintain a coherent and well-founded line of argument.

3 Reading list and other teaching material

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

Thrun Sebastian, Burgard Wolfram, Fox Dieter (latest edition)
Probabilistic Robotics
MIT Press, 647 pages

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, and presented at the start of the course.

4 Teaching formats

Teaching on the course takes the following format:

Lectures and seminars

5 Examination

The course is assessed through an examination in the format of

Oral presentations and active participation in discussions at seminars. If the performance during the seminar is not deemed adequate, the student will be asked to provide a written report instead.

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.