UNIVERSITY OF GOTHENBURG

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT669 Autonomous and Cooperative Vehicular Systems, 7.5 credits

Självständiga och kooperativa fordonsystem, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2016-07-01 and was last revised on 2019-12-17 to be valid from 2020-08-31, autumn semester of 2020.

Field of education: Science 100%
Department: Department of Computer Science and Engineering

Position in the educational system

The course is offered within the framework of several degree programmes. The course is also a single subject course at the University of Gothenburg.

The course can be part of the following programmes: 1) Computer Science, Master's Programme (N2COS), 2) Applied Data Science Master's Programme (N2ADS) and 3) Software Engineering and Management Master's Programme (N2SOF)

Main field of studies	*Specialization*
Computer Science	AXX, Second cycle, in-depth level of the course cannot be classified
Software Engineering	AXX, Second cycle, in-depth level of the course cannot be classified

Entry requirements

Successfully completed courses corresponding to 120 hec within the subject Computer Science, Software Engineering or equivalent. A course (7.5 hec or equivalent) in one of the following areas is required: Computer Communication (DIT420 or equivalent), Computer Networks (DIT663 or equivalent), Operating Systems (DIT400 or equivalent), Algorithms (DIT600 or equivalent) or Project: Industrial IT and Embedded Systems (DIT168 or equivalent).

Applicants must prove knowledge of English: English 6/English B or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Learning outcomes

After completion of the course the student is expected to be able to:

1. Knowledge and Understanding

- Demonstrate knowledge of the basics in robotics.

- Demonstrate knowlede of robotics control and/or communication systems with emphasis on their contruction, their programming, and insights of current research and development in the area.

2. Skills and abilities

- Develop and design distributed control algorithms, programs, network protocols, which are adapted to the needs and capacities of road users and which meet the societal requirements of sustainable development in social and ecological terms.

- Demonstrate hands-on experience with programming of robots.

- Collaborate in groups with different constitutions and backgrounds.

- Plan an engineering task, set up milestones, keep the project running, perform realistic assessments about resources requirements and possible results.

- Present the results in a clear way, both orally and in writing.

3. Judgment and approach

- Referee engineering projects of peer students and provide feedback in a professional manner.

- Judge the applicability of different algorithmic and technical solutions, with constraints such as cost and performance.

Course content

This project studies systems of low cost miniature vehicles that use wireless communication on a large scale open source test-bed. The test-bed may be geared with onboard sensors, such as cameras, laser, radar, speed sensors, etc. In this course the student will learn how to design vehicle systems that can move autonomously and/or communicate with other vehicles for coordionating their actions. The student will

simulate vehicular systems or construct such systems that are based on miniature vehicle models (robots).

This course setup includes a short sequence of cross-disciplinary lectures that will prepare the students and allow their project groups to share a wider common background. Moreover, the course setup includes weekly presentations of project progress reports in the class room that is followed by a discussion. These discussions, led by an expert in the area, would discuss solutions to problems that students encounter.

Form of teaching

Lectures, project meetings, reports and project deliverables.

Language of instruction: English

Assessment

The course is examined by a project plan, written reports (after halv the course and at the end) which are also presented orally and require demonstration of the developed systems. In order to pass the course the student is expected to participate actively in the seminar lectures, including presentations and discussion of studied topics. The student is also expected to provide feedback for other groups' project plans and reports. All the work is commonly carried out in groups of 2-3 students.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
To be awarded grade Pass (G), the student shall demonstrate multi structural knowledge by carrying out presentations and producing a report that is well structured and easy to read, that analyses a related problem using concepts defined by the course literature,

that properly cites the course literature, and whose content covers all learning outcomes and is innovative.

To be awarded grade Pass with Honor (VG), the student shall demonstrate the ability to compare the state-of-the-art technologies with the results produced in this course.

Course evaluation

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

The course is a joint course together with Chalmers.