1 Name, Scope and Level of the Course
The course is provided by the University of Skövde and is named Autonomous Systems A1F. It comprises 6 credits and is on advanced level. The level of progression of the course is A1F.

2 Objectives
Upon completion of the course, a student should have accomplished the following learning outcomes and be able to:

- explain the meaning of autonomy and how it relates to autonomous systems,
- define and discuss different levels of autonomy,
- evaluate the level of autonomy in a system,
- describe existing technologies (algorithms, sensors, robots, etc.) used for achieving autonomy,
- select and justify an appropriate level of autonomy for a future system,
- implement a program to control an autonomous system.

3 Course Content
The course addresses autonomous systems in the context of production, factory environments and automation. Autonomy can exist in varying degrees in a system subject to the problem that is expected to be solved and it can also exist at various levels within the control software of a system. With this in mind the course will cover a range of example situations, algorithms and techniques related to autonomy. These topics may include the following: the meaning and definitions of autonomy and autonomous systems, types of sensors and their uses, types of robots and how they can be made autonomous, algorithms for Path planning/navigation and optimisation, algorithms for Collision avoidance, including feedback from sensors, algorithms for factory wide autonomy, virtual development of autonomous systems, implementation strategies for autonomous systems.

4 Forms of Teaching
The teaching comprises lectures, seminars and lab work. Group discussion features in all modes of delivery.

The teaching is conducted in Swedish. Some teaching in English may occur.

5 Examination
The course is graded A (Excellent), B (Very good), C (Good), D (Satisfactory), E (Sufficient) or F (Fail).

Registration of examination results:

<table>
<thead>
<tr>
<th>Name of examination</th>
<th>Credits</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab assignment</td>
<td>2 credits</td>
<td>G/U</td>
</tr>
<tr>
<td>Written report¹</td>
<td>4 credits</td>
<td>A/B/C/D/E/F</td>
</tr>
</tbody>
</table>

¹ Determines the final grade of the course.

Students with a permanent disability who have been approved for special educational support may be offe-
red adapted or alternative examinations.

6 Admission Requirements
Prerequisite courses for this course are: Passed courses: VP707A-Scientific Theory in Informatics A1N and VP711A-Virtual Intelligent Machines A1N and VP712A-Control Theory A1N. The prerequisites for this course are a Bachelor degree of at least 180 higher education credits (equivalent to 180 ECTS) within the fields of integrated product development or production engineering or automation engineering or mechanical engineering or information technology or similar.

A further requirement is proof of skills in English equivalent of studies at upper secondary level in Sweden, known as English course 6 / English course B. This is normally demonstrated by means of an internationally recognized test, e.g. IELTS or TOEFL or the equivalent.

7 Subject, Main Field of Study and Disciplinary Domain
The course forms a part of the academic subject area of Virtual Product Realization. The course is a part of the main field of study in Virtual Product Realization at the University of Skövde. The disciplinary domain of the course is Technology.

Every course at the University of Skövde belongs to a subject. The division of subjects is used for follow-up and quality assurance. A main field of study is an area in which a degree can be awarded. Disciplinary domain is a division which is used by the government for the allocation of resources for studies at basic level and advanced level.

8 Approval of Course and Course Syllabus
The course was approved by the Curriculum Committee for Engineering Science on 5 March 2018. This course syllabus was approved by the Curriculum Committee for Engineering Science on 4 March 2019. It is valid from 1 July 2019.

9 Overlapping with Another Course
This course cannot constitute a part of a degree also containing a course the content of which is totally or partly equivalent to the content of this course.

10 Additional Information
Further information will be available on the university’s website before a course is given.

National and local regulations for higher education are available on the university’s website.

Upon completion of the course there will be a follow-up. The main purpose of this follow-up is to contribute to improvements of the course. The students’ experiences and views constitute one of the criteria for the follow-up and are gathered by means of course evaluations. The students will be informed of the results of the follow-up and any decisions regarding actions that are to be taken.

11 Course Literature and Other Educational Materials
The course literature consists of a set of chosen scientific articles and book chapters. A list of these are provided by the course director and are listed on the course home page for each time the course is given.