1 Name, Scope and Level of the Course
The course is provided by the University of Skövde and is named Modeling and Optimization A1N. It comprises 6 credits and is on advanced level. The level of progression of the course is A1N.

2 Objectives
After completed course the student should be able to:
- show general knowledge on mathematical and quantitative tools used for modelling of systems within virtual product realisation,
- show general knowledge on statistics and probability models used for modelling of systems within virtual product realisation as well as input and output data analysis,
- demonstrate the skills to model and optimize systems within virtual product realisation processes, and,
- understand the general theoretical and methodological framework of experimental design and various optimization techniques as well as their specific applications in virtual product realisation systems optimisation.

3 Course Content
The course is composed of a series of lectures interwoven with short laboratory works (hands-on). The topics covered include: mathematical modelling of systems within virtual product realisation including queuing models and system theoretic models; simulation modelling and analysis of various types of production systems; modelling, simulation and optimisation of product and production designs with consideration to ergonomics. The course also cover virtual product realisation systems optimisation using design of experiments and metaheuristic algorithms.

4 Forms of Teaching
The teaching comprises lectures and laboratory sessions.

The teaching is conducted in English.

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>Written assignment</td>
<td>2 credits</td>
<td>G/U</td>
</tr>
<tr>
<td>Project presentation</td>
<td>1 credits</td>
<td>A/B/C/D/E/F</td>
</tr>
<tr>
<td>Essay¹</td>
<td>3 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 offered adapted or alternative examinations.

6 Admission Requirements
The prerequisite for this course are a Bachelor degree of at least 180 higher education credits (equivalent to 180 ECTS) within the fields of integrated product de-
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 February 2018. This course syllabus was approved by the Curriculum Committee for Engineering Science on 7 May 2018. It is valid from 1 July 2018.

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
