1 **Name, Scope and Level of the Course**
The course is provided by the University of Skövde and is named Biomarkers - Data Analysis A1F. It comprises 7.5 credits and is on advanced level. The level of progression of the course is A1F.

2 **Objectives**
After completed course the student should be able to:

- define and describe concepts regarding the identification, verification and validation of biomarkers in medicine,
- extensively describe how currently available biomarkers are used and discuss the need of using systems biology methods to identify and verify biomarkers in molecular medicine,
- extensively describe statistical, bioinformatics methods, and systems biology methods are used to analyse to identify and verify biomarkers,
- independently apply, analyze and evaluate the use of biomarkers in molecular medicine,
- discuss the ethical aspects of using biomarkers as diagnostic, predictive and prognostic tools, and
- present scientific results orally, in written form, and critically evaluate scientific work regarding biomarkers and their use in medicine.

3 **Course Content**
The course integrates knowledge in biology, biomedicine, molecular biology and bioinformatics with the aims to identify, verify and validate biomarkers in molecular medicine by using methods in systems biology. The course involves three sub-courses. The first one is based on a number of written assignments where the students work with different data sets. The second one provides the students with an opportunity to deepen their knowledge in the analysis of large-scale data in the context of biomarkers. Finally, in the last sub-course, the project is presented orally.

4 **Forms of Teaching**
Teaching comprises lectures, computational laboratory exercises, seminar/group discussions and oral presentations.

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>Project</td>
<td>4 credits</td>
<td>A/B/C/D/E/F</td>
</tr>
<tr>
<td>Written assignments</td>
<td>2.5 credits</td>
<td>G/U</td>
</tr>
<tr>
<td>Oral presentation</td>
<td>1 credits</td>
<td>G/U</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
Prerequisite courses for this course are: passed SY763A-Experimental Design and Data Analysis for Life Science A1N and passed BV705A-Biomarkers in Molecular Medicine A1N and attended SY765A-Systems Biology A1F and attended BI731A-Bioinformatics Analysis with R A1N (or the equivalent).

7 Subject, Main Field of Study and Disciplinary Domain
The course forms a part of the academic subject area of Systems Biology. The course is a part of the main field of study in Systems Biology at the University of Skövde. The disciplinary domain of the course is Natural Sciences.

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 Bioscience on 28 September 2017. This course syllabus was approved by the Curriculum Committee for Bioscience on 20 December 2018. 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
Scientific articles.