1 Name, Scope and Level of the Course

The course is provided by the University of Skövde and is named Analysis of NGS Data 2 A1F. It comprises 6 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:

- use the basic commands and command-line tools in a Unix environment,
- give a detailed description of error sources and quality measures for raw data originating from the most commonly used NGS platforms,
- perform quality control and error correction of NGS raw data and, in a critical analysis, present results from different tools for this purpose,
- give a detailed account of the principles for assembly of reads into genome sequences,
- understand and describe the differences between de novo assembly and assembly using a reference genome sequence,
- perform genome assembly using commonly used software for this purpose,
- describe the principles for how variants are identified from NGS data,
- give a detailed description of the principles for analysis of gene expression based on RNAseq data, and
- perform analysis of gene expression and, in a critical analysis, present and compare results from different algorithms for this purpose.

3 Course Content

This course provides a continuation of "Analysis of NGS data 1" and presumes that the student has good knowledge of technical platforms for NGS, and is familiar with the structure and format of NGS raw data. The course covers the steps of bioinformatic analysis of NGS data, from low level analysis (such as error correction), through genome assembly, to high level analysis (such as variant calling and analysis of gene expression). The teaching consists of theoretical lectures combined with computer exercises and written assignments. Upon completion of the course, the student should have wide in-depth understanding of analysis problems and algorithms for NGS data, and have acquired good practical skills in performing such analysis.

4 Forms of Teaching

The teaching comprises lectures, supervision, laboratory sessions and exercises.

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). The final grade will be issued only when all examinations are approved.
The final grade of the course is determined by the average from the grades for all written assignments; A=5, B=4, C=3, D=2 and E=1. The average value is rounded to the nearest integer (half rounded up) and translated into a final grade according to 5=A, 4=B, 3=C, 2=D and 1=E.

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 1</td>
<td>2 credits</td>
<td>A/B/C/D/E/F</td>
</tr>
<tr>
<td>Written assignment 2</td>
<td>2 credits</td>
<td>A/B/C/D/E/F</td>
</tr>
<tr>
<td>Written assignment 3</td>
<td>2 credits</td>
<td>A/B/C/D/E/F</td>
</tr>
</tbody>
</table>

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

6 Admission Requirements
Prerequisites for the course are the attended course BI732A-Analysis of NGS Data 1 A1N (or the equivalent).

7 Subject, Main Field of Study and Disciplinary Domain
The course forms a part of the academic subject area of Bioinformatics. The course is a part of the main field of study in Bioinformatics at the University of Skövde. The course can also be a part of the main field of study in Systems Biology. 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 22 February 2018. This course syllabus was approved by the Curriculum Committee for Bioscience on 24 October 2020. It is valid from 1 July 2020 and replaces the course syllabus approved 22 February 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
Scientific articles.