



NORBIS Summer School 2016

An introduction to molecular biology, bioinformatics and biostatistics
- *for students, by students*

What is this, and who can join?

This is an introductory summer school for NORBIS students and other affiliates, who want to obtain a general background in topics that are relevant for studies within bioinformatics, biostatistics, and systems biology. To ensure a wide variety of backgrounds, we encourage interested students in surrounding fields such as cell- and molecular biology, marine studies, genetics and medicine to take part as well. Topics will include basic molecular and cell biology, experimental design, statistical methods in biology and informatics, sequence analysis and next-generation sequencing, proteomics, structural bioinformatics and metabolic networks.

What will you learn?

Students within and around NORBIS represent a wide variety of topics, from clinical medicine and biodiversity to statistical inference and mathematical modelling of networks, though many of you may still feel relatively specialised into a few subjects. As a means of creating a common NORBIS environment, we want to provide you with a baseline of knowledge within the range of topics covered by our research school. By attending this summer school, we further aim for you to be able to view your field from different angles, and also easier being able to integrate into inter-disciplinary research groups and projects.

The summer school will consist of four parts (see last page for tentative program);

- *Morning primer sessions*, with introductory lectures on topics relevant for NORBIS students, each day preparing you for the following lunch session (by school participants)
- *Lunch keynote sessions*, together covering five central NORBIS topics (by invited speakers)
- *Afternoon group sessions*, with cross-disciplinary group work
- *A poster session*, where all participants present their own research project

Morning sessions: A general introduction to topics covered by NORBIS, presented by fellow summer school students

Having students from a wide variety of topics is a strength that we plan to take advantage of. *We will ask each participant at the summer school to teach a general concept of your own subject to your fellow students.* Rather than presenting your own specialised research topic, we want you to pick among a list of pre-defined concise topics, within basic molecular and cell biology, experimental design, statistical methods in biology and informatics, sequence analysis and next-generation sequencing, proteomics, molecular modelling and metabolic networks (see tentative program on last page for ideas). Lectures should be short, about 20 minutes each. Central concepts that turn out to not be represented by any of the participants will be covered by NORBIS.

Through this summer school, you will thus learn from the expertise of other students, while at the same time gaining experience in teaching and making your own field accessible to students from nearby and more distant fields. We will encourage interactive lectures, with a low threshold for asking questions, and “teachers” will have an opportunity to sense the level of understanding for their own field from students of other or even neighbouring fields. Learning future collaborators’ point of view may further turn out to be a valuable experience for your future academic career.

Each day has a high-level topic defined in terms of an area of study (application area). Every day will also include lectures on bioinformatics / biostatistics topics.

To ensure high quality of content and presentation, each participant will have a “mentor” who gives feedback on the presentation at least two weeks before the school starts. The student should give a rehearsal presentation to his / her mentor, via skype or similar if they are not co-located. The mentor will give feedback so that the presentation at the summer school will be of high quality and at an appropriate level for the audience.

Lunch sessions: Keynote lectures on central NORBIS topics, by invited speakers

The morning lecture sessions will further serve as primers; to enable you to follow a set of keynote lectures presented after lunch by excellent scientists affiliated to NORBIS. The keynote lectures will cover five central topics within our research school; genetics, gene expression, proteomics, systems biology, and metagenomics. The lectures will include many aspects and techniques within bioinformatics and biostatistics, and illustrate their utilisation in real-world applied projects. After each keynote lecture, there will be a summary section to illustrate how the lecture is connected to the primers of the morning session.

Group work: cross-disciplinary discussions

Upon registration, each participant will define a problem in her/his current project – or within the field in general. The challenge must fall within the topics covered by NORBIS, and should further be contemporary and preferably relevant for a wider public. You will be placed in cross-disciplinary groups, with representatives from suitable fields, and will discuss a selected issue during the course, hopefully approaching a solution by the last day. Examples of relevant problems may include issues such as choosing an appropriate set of data sets for testing a novel method, choosing simulation approaches to generate challenging test data sets, choosing between multiple sample points and replicates, interpreting loss of a signal after drug treatment, understanding diverging results between simulation and empirical testing.

Through this process, we expect that you will gain valuable experience in approaching problems in cross-disciplinary groups, something they are highly likely to take part in as researchers later in their career. An added benefit may be that some challenges actually are resolved at the end of the summer school.

Poster session

All participants at the summer school will present a poster describing their own research project. After the poster session, we will have a common dinner for all participants and invited speakers.

Practical information

Register here: goo.gl/forms/7CA573E0Cq

Limited number of places available. NORBIS PhD students will be prioritised, but everyone can apply.

The school will be held at Vilvite, Bergen.

Attendance at the NORBIS summer school is free of charge. NORBIS will cover travel and accommodation for all NORBIS members. See norbis.no/admission-to-the-school for information on how to apply for membership. Non-members can also apply to have their travel and accommodation costs covered (include estimated costs for travel and accommodation).

2-3 ECTS may be earned during this summer school. This must be arranged with your local institution.

Time schedule:

Registration deadline:	29 th April
Confirmations of attendance:	6 th May
Topics assigned:	6 th May
Presentation feedback by mentor:	by 29 th May
School start:	13 th June

For further enquiries, please contact

Inge Jonassen (inge.jonassen@uib.no)

Christine Stansberg (christine.stansberg@uib.no)

Tentative program – details may depend on the distribution of participants within the various topics

Monday - Molecular biology	Tuesday - Gene expression	Wednesday - Translation and proteomics	Thursday – Systems biology	Friday - Metagenomics
Principles of genetics and inheritance	NGS - lab principles and data analysis	Regulation of translation - including ncRNA	Integration of data from different sources	Biological databases
Evolution	Principles of gene expression - genetic instructions, mRNA working copy, protein product	Proteomics	What are metabolic networks and Systems biology	Metagenomics
Sequence analysis	Analysis of differential expression - statistical models	Molecular modelling	Simulation	Metagenomics data analysis
Statistical testing: significance and multiple testing	Regulation of gene expression - epigenetics	Programming and algorithms	Experimental design	Keynote lecture and discussion 10.30-12
Machine learning			Reproducible research	Metagenomics
Lunch 12-13				
Keynote lecture and discussion 13-15				
Genetics / Genome wide association studies	Differential expression, preferably with integration of epigenetic data	Proteomics or translation	Metabolic modelling	Group work 13-14.30
Poster session 15-17		Group work 15-17		15 minutes presentations of group work
Replaced by student presentations if low number of students	Define challenge, discuss strategies. Work through 2-3 possible strategies; what will work, what will not work?	Chose one strategy, define it thoroughly, what is the outcome?	Prepare presentation of strategy for the other groups	Wrap up and evaluation 14.30-15.30
Summer school dinner 18-				