

Teaching Portfolio

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Educational Training

Lecturer Training Programme 2015 at the University of Southern Denmark
Project: improvement of students' understanding of statistics via interactive tools and computer applications.

Pedagogical courses (total of 2.5 ECTS):

- Use student response systems in your teaching (1 ECTS)
- Teaching portfolio: getting started (0.5 ECTS)
- Helping students understand assessment, using rubrics, peer review and templates (1 ECTS)

Administrative Tasks Relating to Education

Administration

2018- Teaching Committee (Undervisningsudvalg) at the Department for Biochemistry and Molecular Biology
2016-Master's Programme in Computational Biomedicine
2018-OERCompBiomed (Open Educational Resources in Computational Biomedicine), online master's courses as part of the Nordic network of Biomedicine educators (NordBioMedNet)

Newly implemented courses

2014-Biostatistics in R I, University of Southern Denmark (main responsible), Master 5 ECTS
2016-Biostatistics in R II, University of Southern Denmark (main responsible), Master 5 ECTS
2018-Workshops in Applied Bioinformatics, University of Southern Denmark (main responsible), PhD 2.5 ECTS
2018-Biostatistics, Sino-Danish Centre (main responsible) 3 ECTS
2017-Applications of mathematics in life sciences, University of Southern Denmark, Bachelor 5 ECTS

International courses and workshops

Organization of workshops and workshop series at international conferences such as Annual Congress of the European Proteomics Association, EuBIC Winter School, Annual Danish Bioinformatics Conference, ...
Organization of conferences with training activities EuBIC Winter Schools 2017 and 2019, EuBIC Developer's Meeting 2018

Experience with Teaching, Supervision and Examination

Regular courses

2014-Biostatistics in R I, University of Southern Denmark, Master's programme in Computational Biomedicine 5 ECTS
2016-Biostatistics in R II, University of Southern Denmark, Master's programme in Computational Biomedicine 5 ECTS
2018-Workshops in Applied Bioinformatics, University of Southern Denmark PhD school, Faculty of Science 2.5 ECTS
2018-Biostatistics, Sino-Danish Centre, Master's programme in Life Science Engineering and Informatics 3 ECTS
2017-Applications of mathematics in life sciences, University of Southern Denmark, Bachelor in Biomedicine 5 ECTS
2015-First-year Bachelor Project, "Functional analysis of a fish oil diet", 10 ECTS

International courses

SDU Amongst others: EMBO Practical Courses 2017-2019
2-week postgraduate course Bioinformatics in Proteomics, Universidade de Brasília, Brasil
Workshops at international conferences (e.g. EuPA 2016, ClinProt2017)

Supervision

Main supervisor of PhD students, postdoctoral researchers, master students and bachelor students since 2015.

Methods, Materials and Tools

Overview of methods:

To my opinion, interactive participation of the student enhances their understanding of even very abstract problems. I apply several techniques to achieve interactivity:

Multimedia: I enhance presentations and lectures by including pictures and small movies that are related to the presented

topic.

Web pages: Large parts of my teaching material are based on html having the following advantages: (i) The slides can contain links to other web pages and teaching materials; (ii) all lectures can be put on a web server for easy access; (iii) the file format generally allows simple conversion to other formats like pdf.

Apps: Recently, I implemented a new method (R markdown + shiny) that allows me and the students to interact with the computer slides during the lecture. As simple example, take the different parameters for the creation of histograms such as bin size and data range. With this type of slides, each student can individually change these parameters and visualize the outcome directly on the presentation. This highly interactive approach will definitely help the students to understand complex statistical and bioinformatics problems in a more intuitive way.

Polls: I use polls to complement my lecturing. They provide the opportunity to assess the students' knowledge during the lecture. With polls, a wide range of information can be gathered from the students: a) assessment of knowledge by asking questions about the presented teaching material; b) increased awareness of individual needs by asking for scenarios for which they would apply the obtained or to-be-obtained knowledge ; c) feedback from the students to identify specific needs and interests to adapt and extend future lectures. Generally, polls are an important tool that ensures that every individual student is taken into account in a "democratic" way. This cannot be achieved when asking the class directly.

Blackboard: It can happen that the teaching material is not detailed enough for complete comprehension of a scientific method. In this case, I provide a more thorough description in combination with the blackboard. The blackboard still is an efficient tool to provide specific answers to student questions or to provide details on a certain item.

Jupyter notebooks: They are an extremely flexible system to combine exercise instructions, executable code fragments, and questions into one document. The student can use the notebooks on their computer or on the cloud. They can be edited to complete the tasks (both coding and answering questions) and then be exported for evaluation by the teacher.

Combination of presentation techniques

Most people are not able to remain focused during an entire lecture. Therefore, it is recommended to change pace about every 15 minutes. I follow a diversified work-flow by combining presentation techniques, making defined breaks for questions and discussions, or changing the current topic.

One of the major drawbacks of presentations with computer slides consists in the mainly passive participation of the audience. The slides should provide only part of the information so that the students focus on the lecturer's speech. In addition, not too relevant information can be presented on e.g. the black board. For further studies, it is useful when the presentation format includes links to relevant web pages and/or publications that can be used by the students.

Furthermore, a lecture should never lose the focus on the broad view when going into specifics. Therefore, I start the lecture with an overview and provide this connection repeatedly. My goal is to experiment further ways of interaction with the students by making the presentation on the screen editable by the students, so they can illustrate their questions by e.g. drawing directly on the respective slides.

Theory and practice

In order to facilitate comprehension of the teaching material, the student's interest needs to be stimulated by providing a structured mix between pure theory and application. As application examples, I describe simple systems that reinforce basic understanding as well as more complex applications in present research. However, even the best lecture cannot replace practice. Ergo, my lectures are accompanied by extensive exercises on the computer.

Supervision methods

The supervised students should become fit for their future in academia and/or industry, and thus be able to accomplish the goals of a given project in a relatively independent manner. In my group, we integrate the new students into our research environment and stimulate collaboration within and outside SDU. My supervision consists of regular face-to-face and group meetings to provide a vivid forum for knowledge exchange, guidance and support.

Educational Development and Educational Research

Development and implementation of interactive teaching material (Shiny apps) to improve comprehension of statistical concepts via interactive web pages. Examples available at <http://computproteomics.bmb.sdu.dk>

Layout and usage of interactive exercise material (Jupyter notebooks) that can be deployed in the cloud. This material is used in OERCompBiomed courses (<https://github.com/oercompbiomed>)