

Summary of the Educational Evaluation of the Bachelor's Programme in Physics at Uppsala University, October 2021

1. Background

1.1 Evaluated education

The evaluated education is The BSc programme in Physics at The Department of Physics and Astronomy, Uppsala University (UU). Responsible for the programme and author of the self-evaluation is Dr. Matthias Weiszflog, programme coordinator.

1.2 The evaluation panel's composition

- Dr. Linn Areskoug, Senior Lecturer, The Department of Education, Uppsala University, convenor of the Evaluation Panel,
- Prof. Dr., Jochen Weller, Dean of Studies, Faculty of Physics, Ludwig-Maximilians-Universität, Munich,
- Privatdozent Dr. Martin Kerscher, Head of Exams Office, Faculty of Physics, Ludwig-Maximilians-Universität, Munich,
- Anna Ivleva, Faculty of Physics, Ludwig-Maximilians-Universität, Munich, student representative.

1.3 Implementation

The method is benchmarking. The evaluation started in January 2020, but was delayed due to restructuring of the evaluation panel and Covid-19 pandemic. In February 2021, the present evaluation panel started the work that is at hand. Material for the evaluation is primarily the self-evaluation and various documents referred to in the self-evaluation. No visits between the UU and LMU were possible, and all meetings and communication were on zoom or email. Meetings occurred throughout spring and early fall 2021. To compensate for the benchmarking method, the evaluation panel has incorporated supplementary information in the evaluation (chapter 3) on how some aspects are organized at LMU, when possible.

2. The evaluation

2.1 Strengths

2.1.1 Content, teaching methods, and assessments

The Physics perspective is addressed in all the taught courses. The student centered and active learning teaching is excellent. The integration of lab courses with experimental physics courses is successful and motivating to the students. The computer skills training early on in their BSc programme is very good, and the focus on one programming language is certainly helpful. At present, Python is a very good choice. We do not have the impression that one can do any better with the formal structure of the assessments.

2.1.2 Teachers' expertise

The pool of teachers are active researchers in their fields which creates good conditions for research-based teaching. There is an organized infrastructure for the pedagogical development of the teachers involved in the programme, and the university encourages continuous dialogue between the teachers.

2.1.3 Students' influence and study environment

The students have good possibilities to address their interests. The mid-course meetings are important to know more about students' opinions. It is particularly positive that students from all three years are participating. Students have access to spaces to study and meet peers, which is positive for community building and identity formation. The collected results of the course evaluations of the BSc programme in Physics shows that students are generally pleased with the design of the programme.

2.2 Areas of improvement

2.2.1 The structure of the programme

Starting theoretical physics courses in the fourth semester is a bit late. As a consequence, the four theoretical physics courses are packed together in two terms.

2.2.2 Ethics and the programme's societal importance

There is a need to develop the training in the field of ethics and science which is connected to the lack of information on how urgent topics of today's society that calls for the expertise of physicists (problem-solving skills, mathematical knowledge, and scientific approach) is addressed in the programme.

2.2.3 Knowledge of disciplinary specific teaching methods

A collected knowledge about disciplinary specific teaching methods and outcome of previous pedagogical projects within the programme would be beneficial to a long-term development.

2.2.4 Gender perspective and equal opportunities

Gender perspectives and equal opportunities are addressed in activities for students as well as teaching staff, but these events are isolated events, not pointing to an integration of the perspective.

2.2.4 Academic achievement and long-term learning

More knowledge on the careers of the students after graduation from the BSc Programme, as well as the MSc Programme, to be able to evaluate long-term learning concerning overall academic achievement (content knowledge and generic skills) from the programmes.

3. Recommendations

3.1 The structure of the programme

Mastering theoretical physics is challenging for a lot of students, spreading out content could be beneficial. Shifting analytical mechanics to an earlier semester could be possible.

3.2 Ethics and the programme's societal importance

The implementation of a dedicated course on ethics for physicists and how their professional knowledge is of importance to urgent issues in society. Teaching methods could highlight oral and written debate skills.

3.3 Knowledge of disciplinary specific teaching methods

An overview addressing the specific results of previous pedagogical development projects in correlation to an ongoing discussion on current teaching practices in higher education based in the needs of the programme.

3.4 Gender perspective and equal opportunities

A specific action plan regarding the integration of a gender perspective and gender equality in the programme, indicating how the faculty's action plan is implemented, should be established. Researchers in gender perspectives and STEM disciplines should be invited to present their research at professional development events for teaching.

3.5 Long-term learning and physicists' professional knowledge in society

A joint effort in tracking the infrastructure of the career paths of students in Physics after graduation would help the development of the programme. The role of Physics in society should be addressed in further development of the programme in combination with ethics and sustainability issues. Different kinds of outreach initiatives could be fruitful opportunities to collect information on alumni as well as stress the relevance of physicists' professional knowledge in relation to societal needs.