

Educational Evaluation 2020/2021

Reviewer report of the Master's
Programme in Medical Nuclide
Techniques and the free-standing
course Medical Physics and
Engineering at Uppsala University

Introduction

The review process was based on the self-evaluations of the Master program in Medical Nuclide Techniques, the self-evaluation of the free-standing course Medical Physics, additional documents as e.g., course evaluations, and the site visit performed in October 2021. This report includes evaluations of the programme and the free-standing course. The main evaluation aimed to find the strength, weakness and improvements for the 11 quality aspects as defined by Uppsala University. The evaluation board performed online meetings before and after the site visit. The review was finalized in December 2021.

The members of the evaluation board were:

Peter Bernhardt, Professor, Gothenburg University, Sweden (Chairman).

Tejas Sawant, Royal College of Surgeons, Dublin, Ireland. (Student representative)

Martina Nilsson, PhD and Strategic Forensic Coordinator, Stockholm Police Region, Swedish Police Authority

Margareta Krabbe, Senior Lecturer, Biology Education Centre

Erik Fries, Professor emeritus, Uppsala University

Summary

The overall impression of the Master program in Medical Nuclide Techniques is that it is a well-structured program with relevant courses. The courses are closely related and seem to be arranged in an order ensuring that the students gradually receive increased knowledge and practical skills during their studies. The teachers seem to be highly devoted to their research and finding pedagogical ways for transferring recent research findings to the students. This is also true for the free-standing course Medical physics and engineering*. Nevertheless, we have some specific recommendations for this course, one of which is that the reasons for its decreased appreciation, i.e., the students mean points in the course evaluations have decreased from 4.7 (2018) to 3.0 (2021), should be analysed.

The students in the program have diverse educational backgrounds such as medicine, physics, chemistry, pharmacy, biomedicine and radiology nursing. In addition, about 90% of them are international students. This diversity can in some respects be a strength but also a weakness, which the program tries to remedy by letting the students learn from each other, through different group assignments. On request, the teachers also support the students with additional materials, e.g., relevant articles and YouTube lectures which seems to be appreciated by the students. However, there are several drop-outs during the first semester indicating that some students don't have a background suitable for the program. We strongly recommend that the reasons behind the drop-outs are investigated. In addition, the program would probably benefit from establishing a more formal support of additional lecture material for students with an insufficient theoretical background.

The programme is linked to world leading research and the education appear to build a good ground also for careers in non-academic settings, such as health care or technology companies. It is not clear to the evaluation group why the programme is not attracting more applicants. The low number of admitted students in the programme and in the programme-specific courses, such as 3DR407 *Labelling chemistry and compound*

development, is negative for the students and for the long-term sustainability of the programme.

The applicants should be informed that depending on their previous training, additional studies might be required, the content of which should be specified. Furthermore, interviews in the admissions process would be valuable both for the program and the students. The IMIM programme at Uppsala University has experience with this procedure. Therefore, the review board recommends the program director to consult the IMIM programme about this issue.

* The course 3MG050 Medical physics and engineering 5 credits gives an overview of physics application in medicine for diagnostic and therapeutic aims. The course attracts students mainly from the master programme in engineering physics. Although this course could be valuable for students in the master programme in Medical nuclide techniques, the curriculum does not allow for students to study this course and, students are unlikely to fulfill the prerequisites of 60 credits in physics and technology.

Specific strengths/weakness/improvements to the 11 aspects of quality

1. That the study programmes shall comply with the provisions of the Swedish Higher Education Act (SFS 1992:1434) and the outcomes described in the Qualifications Ordinance, Annex 2 to the Swedish Higher Education Ordinance (SFS 1993:100), as well as programme-specific objectives, i.e., that actual learning outcomes correspond to expected learning outcomes.

The expected learning outcomes are described for the different courses; however, the organisation of the syllabi structures had to be improved.

Weakness/Improvements:

- Need for structure – a formal list of expected learning outcomes for the programme, i.e. a program matrix, should be available.
- The different course syllabi should be structured in a similar way, with the subheadings:
 - Knowledge and understanding
 - Skills and abilities
 - Judgement and approach
- Assure, by the course syllabi and program matrix, that each learning outcome is examined, and in which course.
- A designated programme introduction course/module may be introduced to overcome gaps/differences in prerequisites in admitted students.

2. That the content and teaching activities are founded on a scientific basis and proven experience.

The programme is linked to world leading research in the area of medical nuclide techniques. The students have excellent possibilities to gain knowledge and skills within this interdisciplinary area of research in the programme. Definitely a strength in terms of close connection with academia and research.

Weakness/Improvement:

- The strength of the research opportunities can be used to further connect to hospitals, industry, and market-relevant opportunities; e.g., by internships and summer courses.
- The course content should be broader to include topics apart from oncology, which seems to be the main topic in the program while diagnosis of other diseases with radiopharmaceuticals are less covered.

3. That teaching focuses on the learning of students/doctoral students.

The programme proud itself with dedicated instructors who are enthusiastic about implementing new teaching methods, e.g., flipped classroom model and Zoom during the pandemic. The students appreciate the lectures. The different backgrounds and knowledge are used and the diversity is utilised in a good way.

Weakness/Improvement:

- The small class sizes have several negative effects on the learning of the students: Small class size may be hindering the interdisciplinary nature and learning experience. The small classes also limit the programme in providing extra modules/courses to overcome gaps in student prerequisites and to provide more elective courses.
- The small number of students in the programme limits student network building and may negatively affect the formation of a professional identity in students.
- For several years the students in the free-standing course have been asking for getting access to previously given exam questions, which the teachers have denied. However, by law these documents should be publicly available, so the teachers must meet the students' demand.

4. That the intended learning outcomes are examined using appropriate methods and in a legally certain manner, and that progression is ensured.

While the syllabus and learning outcomes may not be clearly defined, students do seem to be receiving excellent learning opportunities due to the dedicated teachers.

Weakness/Improvements:

- It is not possible to systematically assess if intended goals are met given the absence of well-defined, structured course matrix.

- Some courses and modules in the programme are assessed by well-developed detailed assessment templates (e.g. project work, degree project and some lab reports), we support the suggestion in the self-evaluation to develop similar assessment templates for more or all courses in the programme.
- The experience and assessment of a student doing a lab project will depend on the supervisor (lab mentor). Therefore, the assessment of a student's performance should be made by more than one person. A student self-evaluation of the performance could be introduced as a complement to build student's insights into strengths and weaknesses.

5. That staff involved in the study programme possess relevant and up-to-date expertise in the subject matter, that they have pedagogical and/or subject didactic expertise, and that there is sufficient teaching capacity.

The staff have strong research foundation and there is a diversity in research backgrounds.

Weakness/ Improvement:

- Given the small size of the teaching staff, it will probably be difficult to find a substitute in case of illness.
- Extended collaboration with other Master programmes might be an improvement as the teaching capacity is vulnerable (more collaboration and interaction between teachers as well as student might enrich the programme and the learning outcome).
- It is not clear if instructors from other research backgrounds have enough space and time for students to meaningfully engage with them over the duration of the course. How involved are the instructors from other faculties?
- It is not clear how much support and time for pedagogical training the instructors have.
- Strategies to support teachers to become "Excellent teachers" should be defined.

6. That internationalisation, international perspectives and sustainability are promoted.

Students from various countries and backgrounds are represented in the class. It is a strength that a network of the alumni students seems to be established, for easy follow-up of career paths and other contacts. The formation of a programme-supported alumni association could help during years with few alumni.

During the first semester in the Master programme, the students participate in the joint seminar series "Professional training" that is arranged for all Master students at the medical faculty. The seminars are once a week and covers e.g. different ethical aspects, sustainability in research and intracultural differences, i.e. the seminars seem to cover the learning objectives, for a Degree of Master, that is not specifically defined in the programs course syllabus. It is mandatory to participate in the seminars.

Weakness/Improvements:

- The completion rate needs to be improved, possibly through better marketing, leading to the recruitment of higher numbers of admitted and more qualified students.
- Previous master thesis work should be presented more clearly, to market and recruit more students.
- The contribution of the medical nuclide techniques in UN Sustainable development goals could be highlighted in PT training and/or in other parts of the programme. The students could be involved in defining the contributions to sustainable development (as suggested in the self-evaluation).

7. That a gender equality perspective is integrated into the study programme.

The programme appears to have an advantageous gender balance in the group of admitted students (most years).

Discussion about the equality perspective is performed during programme planning stage. Further, the Uppsala University's "Action plan for equal opportunities" seems to be well integrated in the study programme.

8. That the study programme meets individuals' and society's needs for learning and professional knowledge and prepares students for future careers.

The students will be well prepared for research within academia. Some students need long time to find relevant jobs outside of academia and PhD positions.

Weakness/ Improvements:

- Efforts should be made to provide the students with a better link to the work market within hospital and industry.
- Efforts should be made to find complements to study visits (videos, lectured from former students, potential employers etc.).
- Students can be offered lists of potential future work places, e.g. where alumni work, and project work and degree project can be linked to potential future work places.
- Introduce mentor programme for students.
- Prepare marketing/information material for prospective employers.

9. That students/doctoral students have influence on the planning, implementation and follow-up of the study programme.

Course evaluations are performed but the response rates are modest. Student representatives are elected during the first semester, but no regular meetings with the representatives are scheduled.

Weakness/ Improvements:

- The response rates for the course evaluations need to be improve, e.g. by scheduled times for course evaluations.
- Regular meetings with the student representatives should be arranged.
- Larger student groups will facilitate and diversify student feedback.
- The programme evaluation should be re-installed. Even with low response rates, programme evaluations are valuable.

10. That all students and doctoral students are provided with an accessible and fit-for-purpose study environment.

The students appreciate the study environments.

Weaknesses/improvements:

- Some of the technical study equipment is funded by the teacher's research funding's. Strategies for securing study equipment and relevant technical instrumentation are recommended.

11. That continuous follow-up and improvement of the study programme is carried out.

Yearly plans for the development of the program and the free-standing course are performed, which are followed up the year thereafter.

Weaknesses/improvements:

- Improve the follow-up by utilizing a programme matrix of the learning outcomes.
- Increase the response rates of the course evaluations, e.g. by scheduled times for evaluations.
- Arrange meetings with student representatives.
- Encourage Alumni networking by offering some yearly activity for present and former students, e.g. by a lecture, party or study visit.