

Educational Evaluation 2020/2021

Reviewer report of the Master's
Programme in Forensic Science at
Uppsala University
- and the free-standing courses
Advanced Course in Immunology,
Genetics and Pathology and
Experimental Immunology,
Genetics and Pathology

Introduction

The review is based on the self-evaluation (and appendices) of the Master's programme in Forensic Science including the freestanding courses Advanced Course in Immunology, Genetics and Pathology (30 and 15 credits) and Experimental Immunology, Genetics and Pathology (15 and 7.5 credits). In addition, more information was requested, such as course evaluations, examinations and information about the Master's theses. A site visit was performed in October 2021, where the programme-director, teachers and students were interviewed. The evaluation board also performed online meetings before the site visit. This reviewer report summarises the findings and recommendations, where strengths, weaknesses and suggested improvements are described, within the 11 quality aspects defined by Uppsala University. The review was finalized in December 2021.

The members of the evaluation board were:

- Martina Nilsson, PhD and Strategic Forensic Coordinator, Stockholm Police Region, Swedish Police Authority (Chairman).
- Tejas Sawant, Royal College of Surgeons, Dublin, Ireland (Student representative).
- Erik Fries, Professor Emeritus, Uppsala University.
- Niels Morling, Professor, Department of Forensic Medicine, University of Copenhagen.
- Margareta Krabbe, Senior Lecturer, Biology Education Centre.
- Göran Andersson, Professor, Swedish University of Agricultural Sciences.
- Nicholas Foulkes, Professor, University of Heidelberg / Karlsruhe Institute of Technology, Germany.

Summary

The evaluation board finds that the Master's programme in Forensic Science has a well-structured organization and provides both general and specialized knowledge within forensics to prepare the students for future work within the research, governmental or private sectors.

The main strengths of the Master's programme are the great engagement and interest from the programme-director, the teachers as well as the students where expected learning outcomes are accomplished. Furthermore, a majority of the graduates from this Master's programme find employment within workplaces highly relevant for the programme indicating that their knowledge and experience within forensics complies with the needs of the labor market. The programme is also continuously revised and updated to ensure that quality, intended learning outcomes and scientific-based teaching are maintained. The programme has several qualities to motivate marketing as a flagship master programme at Uppsala University.

However, the evaluation board points at some potential areas of improvement and development. The main weakness and area of improvement is the sustainability of the programme, regarding responsibility and management. Increased collaboration and involvement of more instructors and teachers sharing the responsibility for the programme and the different courses will ensure more stability and unexpected leave of absence can be managed. The internationalization of the programme could increase by establishing collaboration or network with other similar or complementary educational programmes at prestigious universities. This would allow for increased possibilities for students and faculty and potentially increase the sustainability of the programme. In addition, the response rate of course and programme evaluations should be increased, to enable better coverage of the students' experience and suggested improvements.

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 evaluation board finds that the programme complies with the national goals and that the learning outcomes correspond well with the expected outcomes.

Strengths

- The feedback from alumni regarding learning outcomes has been positive (presentations, ethical discussions, professional training, etc. proved to be relevant in their future careers). An alumni survey (2019) showed that 70% of the students found their first job within less than 6 months and a majority of the workplaces seems to be relevant for learning outcomes from the programme.

Weaknesses and suggested Improvements

- Given the diversity of modules in the course, efforts should be made to allow for overlap and a thoughtful flow from one module to the other to make the progression comprehensible.
- Given the collaboration between departments (which mainly is regarded as a strength), efforts should be made to further define responsibilities for the different courses for clarification of e.g. who is responsible for the evaluation of different courses. (It says in the self-evaluation that IGP is responsible for the programme, but a few lines below they retract their responsibility from some courses, like Analytical methods in forensic science and Professional training (PT), which are given by other departments.)
- The PT module contains important teaching and training in subjects relevant for the students. The contents could be clarified in the information material and/or the programme syllabus. To further develop the PT module, the content could be adapted to the specific goals of the programme in forensic science and the examination could be credit-awarding to motivate students and clarify learning outcomes. The PT module also intend to raise important questions on scientific attitude needed to prepare a future scientist, including the generation of hypothesis, treatment and evaluation of data in complex context. This could be highlighted/strengthened and exemplified by cases in forensic science to motivate and educate students in forensic science.
- Considering the fast development of digitalization that is occurring, presumably also in forensic science, there should be a clear goal set to meet the need for capturing, storing, sharing and analyzing big data.
- The list of elective courses could be expanded to involve more and new scientific areas such as AI, computer science, image analysis to allow for student individualization of programme syllabus.

Freestanding courses

The evaluation board finds that the freestanding courses also comply with the national goals and that the learning outcomes correspond well with what is expected. Clearer criteria can be developed to support equal assessment of goal attainment. The freestanding courses allows for several different possibilities to approach recent

scientific research and also allows for connections to future work places outside academia.

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

The evaluation board finds that there is a clear base of science and proven experience regarding the Master's programme's content and teaching activities.

Strengths

- The teachers are recruited from excellent research environment and most of the teachers from the University also perform research within their field of expertise.
- The Master's programme represents a collaboration between four departments and the interdisciplinary nature is generally considered a strength.
- The seminar series Professional training (PT) is mainly appreciated and seen as a valuable complement to give knowledge of the scientific approach with research ethics and practice during the first semester of the programme. Even if some students don't see the value of the PT seminars in the beginning, they get more prepared for future courses and workplaces.
- Interprofessional learning by interactions between students and different professionals, such as police officers, chemists, pathologists, relevant to forensic science is a unique and impressive feature of this programme and is not commonly seen in other university Master's programmes.

Weaknesses and suggested Improvements

- Even if the interdisciplinary nature mainly is regarded as a strength, the different parts and aspects need to be carefully balanced to avoid overload and failure to meet learning objectives. For instance, students remarked that it is better to avoid cursory and surface-level coverage of some topics and focus on thorough learning.
- The Master's programme should offer a more in-depth module on biostatistics.
- The content and goals of the PT could be highlighted in the educational materials and also examined (to give credits?) to increase the student's engagement. The students or alumni could be involved to get a more programme specific content to the PT (introducing specific examples from forensic science and work places).

Freestanding courses

The evaluation board finds that also the freestanding courses are founded on scientific basis and proven experience. Clearer instructions should be prepared for supervisors regarding what is mandatory during the courses. The reports (or title/supervisor/work place only) from freestanding courses internship/training could be shared with programme students to build programme identity and inspire students (or prospective students).

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

The evaluation board finds that the teaching focuses on the learning of students, and that they have influence on the learning processes.

Strengths

- The course evaluations are followed up to ensure that the learning of the students is in focus, and if needed changes are performed.

- The scope of the course seems adequate and engaging for students.
- The two students interviewed described different levels of expectations before the programme but both were satisfied and described that they received both basic introduction to different techniques and topics as well as more in-depth knowledge within specific areas during the programme courses.
- A particular module on law and forensics received appreciation from students. The content was new and interesting for most students and it offered them a better understanding of the legal situation in Sweden.

Weaknesses and suggested Improvements

- Some students expressed a lack of constructive feed-back for their laboratory reports, which might be further improved.
- Efforts should be made to establish rules about when detailed feed-back is warranted or not - sometimes just an OK may be OK.
- When some of the students have areas of specific interest within forensic science, efforts could be made to encourage that further by presenting suggestions of contact information and examples of Master theses to be performed within the specific area of interest.
- Teachers suggested that there should be better connection between practical laboratory and theoretical lecture components of the course.
- When the flipped classroom model is implemented, it is important to ensure that students do understand the content at hand (especially in cases where students may lack prior background knowledge or experience). Videos available online or presentations given by fellow students might not be adequate for some students. Teachers could therefore do more follow up and make sure that learning objectives are met.
- The variable skills and knowledge in admitted students should be acknowledged and the described initiatives to provide learning materials in eg. chemistry or molecular biology to cover gaps should be developed.

Freestanding courses

The evaluation board did not interview any student from the freestanding courses but got the impression that the teaching focuses on the learning of students. However, information about the University's support to students should be made more available. Information on potential workplaces to train may increase the number of students taking the opportunity to train individually in the freestanding courses of the programme. Moreover, the training could potentially be considered having 2-3 students in the same project/research group to make courses more attractive to students and supervisors.

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

The evaluation board finds that examinations are performed in a positive manner with great variation.

Strengths

- The overall structure of the programme displays a very clear progression, which is also evident within single courses. The goal attainment matrix is a valuable tool which should be shared, discussed and developed with students and faculty continuously.
- The intended learning outcomes are examined using various methods, such as written reports, laboratory reports, multiple choice questions, writing applications etc. The

interviewed students expressed that the intended learnings were ensured and that the problem-solving approach often used resulted in good learning.

- Examinations, in general, were considered to be fair, adequate and relevant by the students.

Weaknesses and suggested Improvements

- It should be considered whether examinations for several courses could be performed together, to demonstrate how courses could be combined within the field of forensic science.
- Examinations could be improved to allow for sufficient depth in the contents tested. The students mentioned that heavy focus was placed on some topics during teaching but were only tested superficially at the examinations. On the other hand, sub-topics that were not necessarily as relevant were examined (sometimes heavily).
- Exams should be linked to learning goals of the respective course and overall expected programme outcomes.
- The importance of feedback on lab reports/accomplishments could be highlighted. The type of feedback performed e.g. oral/written, could be developed and adjusted to the respective training.

Freestanding courses

Clearer instructions should probably be provided to the supervisors regarding examination of learning outcomes. Support to supervisor and student before, during and after the training by a programme coordinator could improve the learning outcomes and attract more supervisors to the freestanding courses. Furthermore, it's suggested to create and implement an evaluation form with criteria for more clear and uniform examinations.

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 evaluation board finds that the pedagogical and subject didactic expertise is relevant and up-to-date. However, the teaching capacity might be improved.

Strengths

- Good pedagogical expertise exists among the teachers with a generally high teaching quality.
- The impression is that there is a strong focus on using different learning methods.
- Pedagogic initiatives such as the "Activity day" in the course Forensic science and criminalistics are appreciated by the students and should be continued and further developed.
- Teachers' days allow for focus on new pedagogic methods and could allow for subject didactic research by teachers in the programme.

Weaknesses and suggested Improvements

- The department needs to involve more instructors and teachers, especially in cases where a leave of absence may lead to a major issue.

- A yearly pedagogic workshop can be introduced, to present recent development in subject didactics (medicine specific?) or pedagogic tips and tricks used by teachers in the programme. This might encourage further development of existing pedagogic initiatives and inspire to new.

Freestanding courses

The teaching depends on supervision of individual researchers giving in-depth courses. Available projects should continuously be identified from research group leaders and addressed within an updated project bank, as suggested in the self-evaluation report. Alternatively, or as a complement, finished project reports could be shared in full or with title/supervisor/work place, for use by students and programme identity.

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

The evaluation board finds that the programme is based on a very strong international foundation, where the majority of students and teachers come from countries other than Sweden. During the course Law, psychology and forensic expertise, and other courses comparisons are made between legal systems of different countries, promoting an international perspective.

Strengths

- Internationalisation is promoted, and there is a great diversity among the students; 60-70% of the students are from abroad. This is expressed as a strength as the students learn from each other through the discussions they have (essentially during the law course).
- The teachers seem to cherish the presence of students from all over the world in their class. The intellectual exchange of ideas from students coming from various backgrounds and viewpoints and discussions regarding different approaches to forensics in their home countries were cited.
- There is a large interest from students to apply to the programme. This seems to be quite unique from an international perspective and facilitates the sustainability of the programme in terms of future applicants.
- The uniqueness of the programme in Europe is a feature appreciated by students; the only other programmes that were mentioned were in the UK at Edinburgh and Newcastle universities. The students who were interviewed (both EU citizens) found it advantageous to study in Sweden given the wide range of opportunities. (Student 1 also claimed that it would be easier for her to keep working in Sweden instead of going back to Spain and finding opportunities there.)

Weaknesses and suggested Improvements

- Sustainability, in the perspective of a shared programme leadership and responsibility, might be the biggest challenge for the Master's Programme in Forensic Science. For the moment, the program is directed by one programme-director, and even though there is administrative help provided for the programme, it seems to be vulnerable regarding the responsibility and management. In order to have a more solid structure for quick replacements in case of planned longer leaves of absence, retirements or sudden sick leaves, more teachers should be involved in the program.
- It is therefore suggested to involve more teachers to share the responsibility for the programme. This can be achieved by assigning a co-director, and have more teachers being responsible for the different courses within the programme.

- The teachers remarked that there are not as many non-EU students in the Master's programme so directed efforts might be necessary to increase enrolment. It is therefore suggested to increase marketing of the Master's Programme in Forensic Science, especially in countries outside the EU (from where few students apply). Furthermore, the global perspectives of the programme can be formalized more in the syllabus, as a specific learning outcome. Support with targeted marketing in non-EU countries, such as China, is provided for centrally at UU.
- A summer school in forensic science for international/non-EU bachelor students can increase the number of applicants from non-EU countries.
- Enrolment can be boosted using marketing and social media. This, in particular, can be directed to non-EU international students. Strategies include gathering information about experiences of alumni during and after their course and sharing it with applicants, sharing information about different opportunities available to students (e.g. performing Master's theses at different institutes).
- It is suggested to extend the collaboration with other international forensic programmes and universities abroad.
- The international content of the programme could be improved by establishing network with international programmes with similar goals.
- Collaboration with faculty from other universities could increase the sustainability of the program and open possibilities for common activities such as joint courses or summer schools. Links to companies with technology relevant to the contents of the programme could be strengthened to enable access to new technology. Accreditation, (e.g. US Forensic Science Education Programme Accreditation) could be a way of increasing the visibility of this programme, to benchmark the programme and to establish networks, which could benefit students as well as faculty.
- From a strategic perspective, the importance of this course at an international level should be more proactively exploited to place Uppsala in a leading position in the coordination of other forensic training activities Europe-wide. An added benefit of such a move could be increased funding opportunities as well as benefit for the visibility of the University of Uppsala at an international level.

Freestanding courses

To get further international experience and exchange, the possibilities of teacher exchanges for the staff at the department should be promoted (this also applies to the Master's programme in general).

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

The evaluation board finds that the programme works to achieve equal opportunities and prevent discrimination.

Strengths

- The joint seminar series Professional training (PT) that is arranged for all Master's students at the medical faculty, includes ethics and the gender equality perspective.
- The programme clearly describes that they actively work to increase accessibility and equal opportunities.
- Active work has also been made to achieve a more even gender balance among the students.

Weaknesses and suggested Improvements

- It would be valuable to get a more even gender balance among students, and previous work and suggestions might be followed up.
- To attract more male students to the programme, establish collaboration with bachelor programmes in which the proportion of males is higher, such as biomedical engineering.
- Increase and/or visualize the technical content of the programme, such as computer science, AI and image analysis with machine learning.

Freestanding courses

The same perspective applies as for the Master's programme.

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

The evaluation board finds that the Master's programme has a great relevance to the labor market and that the students are prepared for future professional practice.

Strengths

- This programme provides our society with urgently needed forensic specialists. Fortunately, the generic skills that the graduates of this programme have acquired are also in demand in other professions.
- The students meet different professionals relevant for their future careers during their education.
- Alumni are invited to talk to the students about their present work.
- Alumni employers have been interviewed about what they expect from their employees.
- The programme and the different courses collaborate between departments at the University and also collaborate with the possible work market outside the University. The students also get practice for some realistic scenarios, such as Court room practice and innocence casework.
- The students are prepared for PhD studies as well as work for different employers. The Swedish students are prepared for work at e.g. the Swedish Police Authority and The National Board of Forensic Medicine in Sweden (30% of the alumni work within these two organizations in Sweden). Students from other countries might need some more education and training before being employed at the corresponding authorities/companies (depending on specific requirements).
- Students are exposed to a variety of activities and skills during the programme that can better prepare them for a career in forensics:
 - Grant writing (part of a module)
 - Ethical discussions (in collaboration with the Bioethics dept)
 - Peer review for thesis projects
 - Collaboration with companies and professional training
 - Career day/ meeting alumni

Weaknesses and suggested Improvements

- Students would like better guidance and training in research-relevant skills e.g. presenting statistical analysis of their data, writing drafts, etc. The students interviewed

asked for more Biostatistics in the programme as well as knowledge needed to better fit future courses and careers.

- Some students remarked that they did not feel adequately prepared to work independently in the field after the completion of the Master's programme. Increasing the number of students that do the individual research projects offered in the freestanding courses of the program could increase the students' confidence in their skills and knowledge. Another possibility is to involve forensic science students in interdisciplinary activities to increase the insight in their learning outcomes. Another suggestion could be to introduce a challenge-based summer school that could complement the current curricula to strengthen the skill to work independently. Master students could be used as teaching assistants in evening or summer courses.
- Surveys on alumni as well as employers have been informative to learn more about learning outcomes from the programme. A specific focus on needed skills in employed graduates could further be investigated by interviews of alumni.
- If possible, the programme should be improved to convey more information regarding requirements for employment within the forensic field in other countries. Extended collaboration with other international Forensic Science programmes, Police Authorities etc. could possibly represent a source of this additional information.
- The knowledge of where the alumni students now are employed, obtained from the recent evaluation, could be further expanded if alumni evaluations are formalized and performed continuously. In addition to this information, a formal list of where they studied for their Master's theses could further increase knowledge for how to prepare for future possible careers.

Freestanding courses

The freestanding courses also provide the students with additional knowledge and skills that prepare them for future careers, something that might be further addressed and promoted to the students.

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

The evaluation board finds that the students have influence on the programme. Student representatives are elected to represent the students in meetings and discussions and the evaluations of each course are processed to identify improvements to be introduced.

Strengths

- The course reports (by the teachers) show that the critique raised by the students (in their course evaluations) are taken seriously and have led to appropriate actions.
- Improvements have been made to the programme as a consequence of previous course and programme evaluations, such as including more study visits. However, not all wishes are practical or possible to implement.
- Both students interviewed agreed that the workload was balanced and they appreciated the responsibility and activities given to students to direct their own learning.

Weaknesses and suggested Improvements

- The response rates of the course evaluations are often low, despite the efforts made for increased response (such as oral evaluations). Higher response rates to strengthen the influence of students can be achieved through scheduled time for questionnaires at the end of the courses.
- Course evaluations could be complemented by regular meetings with student

representatives, such as lunch meetings, to allow for more direct and agile feedback to course teachers and administrators.

- The programme could encourage the start of a programme-specific student driven alumni association for the graduates from the programme. This could be a way for the programme and for the students to build networks with future work places.

Freestanding courses

As described for the programme in general, the freestanding courses also often have low evaluation response rates. These can possibly be increased through personal email reminders.

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

The evaluation board finds that the programme has established a good physical and psychosocial environment with possibilities for students to get various types of support.

Strengths

- The workload in the different courses seems to be at a good level in general (one of the students expressed that the work load was too relaxed, but still felt challenged enough and could learn at a deeper level as a consequence of getting more time to study).
- Class size (approximately 20 students) seems to be working well. Students formed a tight-knit community and are still in touch as alumni.
- The university provided access to state-of-the-art technology along with training.

Weaknesses and suggested Improvements

- Students referred to some English language-related difficulties that might represent drawbacks for optimal collaboration and learning. Introducing higher requirements for English language ability as well as reminding the students of the available language support might improve this issue. Furthermore, students can be challenged in smaller group discussions in early courses in the programme to make students recognize the need of language training.
- The tight-knit alumni contacts could be supported and used as a valuable information and contact source by the programme. This could be e.g. a yearly welcome-back event or sharing news about the programme to an alumni association for forensic science.

Freestanding courses

The same language drawback applies to the freestanding courses. Offering information about language support from the University can help remedy this.

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

The evaluation board finds that thorough actions are taken to follow-up and develop the Master's programme.

Strengths

- Annual development plans, regular alumni surveys, systematic analyses of course evaluations and follow-up of key measures for completion are performed to maintain a high-quality programme.

Weaknesses and suggested Improvements

- The current programme evaluation model states that actions should be compiled and implemented and reported back to the Programme Committee. Possible developments of the study programme and quality work can also be discussed more with course directors during teacher days. All teachers, new and “old”, should be informed about programme goals and their contribution to those, e.g. by use of the goal attainment matrix. Proposal of new courses/modules to improve the programme could be encouraged in teacher days or in meetings with students continuously during the year.
- Increased collaboration with other international Forensic Master programmes (“benchmarking”) might raise awareness of possible improvements of the programme. It may also allow for new specializations of the programme without offering new courses at Uppsala University. Collaboration with other universities might increase the number of incoming exchange students, if wished for.
- Poor response rates for course evaluations, which impact student influence and as a consequence also programme improvements negatively.
- Time should be scheduled for answering course evaluations (with fewer questions) at end of courses.

Freestanding courses

The evaluation board finds that also the freestanding courses would benefit from increased response rates of course evaluations. Similar improvements should therefore be made as for the programme in general. A designated coordinator for the freestanding courses could develop specific evaluation models for the freestanding courses.