

Assessment report
Limited Framework Programme Assessment

Master Forensic Science

University of Amsterdam

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1. Executive summary

In this executive summary, the assessment panel presents the main findings and considerations underlying the assessment of the quality of the Master Forensic Science programme of University of Amsterdam. The programme was assessed according to the four standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands. This assessment benefitted from the open attitude of programme representatives during the site visit, which was much appreciated by the panel.

The organisation of the programme is effective and enables appropriately monitoring of the programme quality. The programme is firmly embedded both in the forensic science research community and in the forensic science professional field, allowing the programme to remain in tune with scientific and professional trends.

Programme management responded adequately to the recommendations of the assessment panel, made during the previous assessment process in 2017.

In the domain-specific framework, the forensic science field is well described and the programme is explained to be aligned with international trends. The programme's objectives are valid, and specify the requirements of master programmes in this field. The intended learning outcomes of the programme are well-aligned with the objectives, meet the domain-specific framework and reach the master level. They are monitored and updated adequately. The panel recommends to reconsider the term expert in the graduation profiles as, strictly speaking, this term is attributed to scientists appointed specifically by legal authorities within particular cases.

The English name of the programme and the choice for English as the language of instruction are justified.

The entry requirements and admission procedures of the programme are elaborate. The policy to determine the number of incoming students to the number of positions for forensic scientists on the labour market is sound. The panel, nevertheless, recommends to estimate the market need more thoroughly. The panel also advises to explore possibilities to enhance the diversity of disciplines (physics, mathematics, etc.) in the student population, for instance by offering more courses in these disciplines.

The curriculum has been logically and coherently structured. The courses are well-organised. The curriculum design with forensic science courses in the first year and master courses in students' bachelor discipline is adequate. Although the curriculum is well-aligned with the intended learning outcomes of the programme, the panel advises to strengthen the curriculum in some ways: to reinforce writing skills and advising knowledge and skills, the latter including the methodology of forensic science advising; to clarify what is being taught about law and different legal systems, how and in which courses practical law training is covered and which guest lecturers address which law-related subjects and to evaluate whether this is sufficient; and to consider developing independently

the subjects of digital forensic science and data science from the course *Cybercrime, Digital Traces & Forensic Data Analysis*.

The staff is very much suited to teach in this programme, teachers having various backgrounds and being able to cover relevant subjects. Teaching capabilities and academic qualifications of teachers are adequate. As teachers are involved in research, students are familiarised with research and new developments in this field. The guest lecturers in the programme are valuable, as they can explain specialist topics.

The teaching philosophy of the programme is appropriate, centring around the active participation of students in interdisciplinary groups. The study methods adopted are diverse and are instrumental in promoting the learning processes of the students.

The information provision for students in the programme is generally well as is the study guidance, provided by the study advisor and programme coordinators. Study progress is monitored adequately and the student success rates and the student drop-out rates of the programme are favourable. Although in the second year of the programme students are offered opportunities to meet, contact moments with fellow students are clearly much less frequent than in the first year. The panel advises to inform students better about the second year and to intensify student meetings and study guidance in this year. In addition, the panel recommends to implement more robust procedures to find internships for Research Projects, for instance by scheduling events where students can meet representatives of organisations offering internships. The panel is rather concerned about students of this programme having difficulties to gain access to biomedical courses of the faculty.

The measures adopted to monitor and assure the quality of examinations and assessments meet university and faculty guidelines and are up-to-standard. The Examinations Board is solid and active in performing their duties. The panel advises the Board to prioritise the execution of the examination and assessment quality assessment at programme level.

The continuous assessment principle is favourable, in the sense of assuring all aspects of students' performances to be assessed. The examination methods adopted in the courses meet the course goals. The students are appropriately informed about the procedures and grading of examinations.

The supervision of the Research Projects with weekly meetings of students and supervisors is well-organised. The approval of the Research Project proposal and the midterm evaluation allow for monitoring the progress of students. The involvement of the independent examiner is effective to arrive at reliable assessments. The panel advises to reorganise the standardised Research Project assessment form, limiting the list to crucial criteria and allowing for more spread of final grades.

The course examinations test appropriately the goals of the courses. The quality and academic level of the final Research Projects meet the master level requirements in the field of forensic science. The grades given by the programme examiners are fair. No projects are unsatisfactory. The topics

addressed in the projects are interesting, the research is done well and the presentation is up-to-standard.

The positions, which graduates of this programme manage to secure, showcase the results these graduates have achieved at completion of this programme.

Having conducted the assessment of the Master Forensic Science programme of University of Amsterdam, the assessment panel finds this programme to meet all four standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands, and consequently judges the programme to be positive in terms of the NVAO Assessment framework. Therefore, the panel recommends NVAO to prolong the accreditation of this programme for another term of six years.

Rotterdam, 29 March 2023,

Prof. dr. D. Meuwly
(panel chair)

W. Vercouteren
(panel secretary)

2. Programme administrative information

Name programme in CROHO: Master Forensic Science
Orientation, level programme: Academic Master
Grade: Master of Science (MSc)
Number of credits: 120 EC
Specialisations: N.A.
Location: Amsterdam
Mode of study: Full-time (language of instruction: English)
Registration in CROHO: 21PK-60338

Name of institution: University of Amsterdam
Status of institution: Government-funded University
Institution's quality assurance: Approved (decision of 18 April 2019)

3. Findings, considerations and assessments per standard

3.1 Standard 1: Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

The Master Forensic Science programme started in 2005 and was initially accredited in 2006. Following positive assessments, the accreditation of the programme was renewed in 2011 and in 2017. In total, 459 students have graduated from the programme.

From the organisational perspective, the programme is one of the programmes of the Faculty of Science of University of Amsterdam. The Faculty Board, chaired by the Dean, is responsible for decisions at the faculty level. Being interdisciplinary, the programme is part of the Institute of Interdisciplinary Studies. This institute bundles expertise on interdisciplinary education within the faculty as well as the university. The programme director, assisted by the programme coordinator, assistant programme coordinator and study advisor, manages the programme and is responsible for the quality thereof. The Teaching Committee, being composed of three lecturers and four students, advises programme management on the quality of this programme. The Examinations Board is responsible for monitoring and assuring the quality of examinations and assessments of the programme.

The programme maintains relations with both the forensic science research community and the forensic science professional field. The Co van Ledden Hulsebosch Center was founded in 2013 to promote forensic science research. Programme management collaborates closely with this centre and lecturers in the programme are researchers in this centre. The Advisory Board with representatives of the professional field has been installed for the programme. The Board meets with programme management, advising them on trends in the professional practice.

The panel was informed about the recommendations by the assessment panel six years ago, in the previous assessment process, and about the follow-up actions by programme management on these recommendations. The following measures were taken.

- Data science and digital forensics fields have been incorporated in the curriculum through the newly developed course *Cybercrime, Digital Traces & Forensic Data Analysis*.
- Practical, hands-on skills training has to some extent been strengthened, although the programme primarily remains academic, scientific and theoretical.
- Teacher involvement was intensified by scheduling two or three teacher meetings each year and by programme management meeting every one of the teachers at least once each year.
- Supervisors are required to fill out the Research Project assessment form.
- Students are trained to write their Research Projects in academic manuscript format and to try and have these manuscripts published.

- Relations of the programme with the professional field have further been strengthened, leading to more graduates securing positions in the forensic science field.

This programme is a two-year or 120 EC academic master programme in the field of forensic science. In order to define and delineate this field, programme management drafted the domain-specific framework for forensic science. Following the framework, forensic science may be defined as the application of scientific principles and techniques to reconstruct events and to address questions of interest to criminal investigations and subsequent court proceedings. The forensic science field is inherently interdisciplinary, includes disciplines of the natural sciences such as biology, chemistry, physics, mathematics and computer science, and touches upon humanities, social sciences, psychology and law. The programme has been shown in the framework to comply with international standards and benchmarks in the forensic science field, such as those of the Chartered Society of Forensic Sciences in the United Kingdom and the Forensic Science Education Programmes Accreditation Commission in the United States.

The programme mission is to strengthen the rule of law both nationally and internationally by educating the next generation of forensic scientists who see the big forensic picture as well as have a sharp eye for scientific detail. Three graduation profiles or roles for graduates of the programme have been identified. These are researchers, experts or advisors. Researchers convert theoretical findings in forensic innovations, experts apply insights and methods in legal cases, and advisors counsel on the relevance and usage of findings in legal processes. Students are educated to take on either one of these three profiles or roles as forensic scientists. Identifying these roles has been instrumental for programme management in arriving at the objectives and the intended learning outcomes of the programme.

The programme builds upon the discipline students studied in their bachelor programme and trains them to expand and deepen their bachelor discipline knowledge and understanding and to apply these to forensic science subjects and problems. The objectives of the programme are to educate students to acquire broad forensic knowledge and understanding, to apply their bachelor discipline knowledge and understanding to forensic problems, and to conduct research on forensic science subjects in their bachelor discipline. Students are explicitly trained to obtain positions in the forensic science field. Graduates may also find positions in other fields, where knowledge and understanding they have acquired are relevant, such as biomedical sciences or chemistry.

From these objectives have been derived the programme intended learning outcomes, specifying the goals students of this programme are to achieve. These intended learning outcomes include gaining broad knowledge and understanding of the forensic science field and of students' bachelor discipline in this field, applying this knowledge and understanding to problems in the forensic science field, acquiring scientific research skills, making judgements in forensic cases, obtaining skills to communicate with expert and non-expert audiences, being able to reflect upon their own reasoning and knowing how to acquire new knowledge.

The intended learning outcomes are kept up-to-date and aligned with developments in the forensic science field, by discussing them with the teachers, many of whom work in this field, and with the Advisory Board, which is composed of representatives of the professional field.

Programme management made a comparison between this programme and the programmes of other institutions in the Netherlands and abroad. From this comparison, it may be deduced this programme shares important traits with programmes in Sweden, Switzerland and the United Kingdom. The programme is largely theoretical and offers less practical training, as compared to the benchmark forensic science programme of University of Lausanne.

Both the name of the programme and the language of instruction are English. The reasons for adopting English are to give international students access to the programme and to prepare students for careers in the academic-level forensic science labour market, which is internationally oriented.

Considerations

The panel regards the organisation of the programme to be effective and to enable appropriately monitoring of the quality of the programme.

The panel evaluates the programme to be firmly embedded both in the forensic science research community and in the forensic science professional field. Programme management maintains close relations with researchers as well as practitioners in this field, allowing the programme to remain in tune with scientific and professional trends and enabling students to find, for instance, internships for their Research Projects.

The panel notes programme management responded adequately to the recommendations of the assessment panel, made during the previous assessment process in 2017.

The panel regards the domain-specific framework for the forensic science field to be valuable. The forensic science field is well described and international standards and benchmarks have been taken into account, allowing this programme to be aligned with international trends in this field.

In the panel's view, the programme's objectives are valid for this master programme in forensic science and specify the requirements of master programmes in this field. From the programme annual report, the panel is pleased to see these objectives being aligned with the University of Amsterdam strategic goals. The programme's intended learning outcomes are well-aligned with the programme's objectives. The panel recommends to reconsider the term expert in the graduation profiles as, strictly speaking, this term is attributed to scientists appointed specifically by legal authorities within particular cases.

The panel evaluates the intended learning outcomes to meet the domain-specific framework. They also meet the requirements for the master level, as specified by the Dublin descriptors for this level. The panel is positive about the monitoring and updating of the intended learning outcomes.

The panel endorses the English name of the programme and the choice for English as the language of instruction, as it regards the reasons given by programme management as valid.

Assessment of this standard

These considerations have led the assessment panel to assess the programme to meet Standard 1, Intended learning outcomes.

3.2 Standard 2: Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Findings

Prospective students have various options to obtain information about the programme, among which the programme website, or direct contact with the study advisor. In the last five years, on average 125 applications to enrol in the programme were received every year. In the last three years, there were over 130 applications per year. The number of students admitted was each year about 33 students. The reasons for applicants not to be admitted are weak motivation, insufficient prior education, unsatisfactory level of scientific reasoning, too low grade point average in the bachelor programme or insufficient communication skills.

The programme director, programme coordinator and study advisor make up the admission board, which decides on admissions. The programme admission procedures are as follows. Candidates are assessed on the basis of pre-defined criteria, such as convincing motivation, analytical skills, communications skills, organisational sensitivity, and ability to work under pressure. Written applications may be rejected directly when they do not meet these criteria. One of the members of the admission board and one of the teachers in the programme hold interviews with every one of the students whose applications are seen as eligible for admission. The outcomes of the interviews, in terms of meeting the criteria mentioned, will lead to students being admitted. Students having forensic science bachelor diplomas of universities of applied sciences (HBO) are eligible for admission.

As has been said, students entering the programme come from various disciplinary backgrounds, depending upon the bachelor programme they have taken. The admission board takes backgrounds into account to arrive at balanced student cohorts. Over the last ten years, the proportion of students with biomedical sciences bachelor degrees diminished in favour of computer science students. The proportion of mathematics or physics students increased but is still relatively low. The proportion of international students is about 30 % to 40 %.

The intended learning outcomes of the programme are connected to five learning trajectories (the so-called Visible Learning Trajectories) which the curriculum is composed of. These trajectories describe areas of knowledge, understanding, skills and attitudes which are seen as critical for forensic scientists' performance. The learning trajectories are forensic process and societal context, forensic traces and analysis, interpretation of evidence, research, development and innovation, and personal development and professional attitude. All courses in the curriculum are connected to at least one of these learning trajectories. Through the learning trajectories, all programme intended learning outcomes are covered by the courses in the curriculum.

The first year of the curriculum introduces students to the theoretical and scientific foundations of forensic science, acquainting them with principles of criminalistics reasoning, the statistical

interpretation of evidence, and hypothesis formulation and validation. All ten courses in the first year are mandatory. In the courses, scientific research knowledge and skills, and written and oral communication skills are addressed. Practical skills are taught to some extent. The *Chain of Evidence* and *Policy, Ethics and Media* courses are integrative courses, addressing complex interdisciplinary cases. In the latter course, ethical issues are discussed. In the second year, students extend and deepen the knowledge and understanding of their bachelor discipline, taking 18 EC in specialisation courses in this discipline, 6 EC of which may be substituted for elective courses. They may also take broadening/interdisciplinary courses or specialise in other fields, subject to the Examinations Board's approval. In addition, students write the *Literature Thesis* (5 EC) and do the *Research Project* (36 EC). The work in these courses consists of individual assignments, the subjects being sufficiently different. The Literature Thesis is meant to address forensic topics through the study of academic literature. The Research Project is meant to do theoretical and practical forensic science research, linking their bachelor discipline to the forensic science field, and to report on this research and the results in scientific journal article format. The Research Project may be done in university or in external forensic science organisations. The practical component in terms of laboratory work, fieldwork or computer simulations is important in this project. Throughout both years, students take the *Professional Development* course, meant for them to work on their professional skills and attitude as forensic scientists. Students are to attend the regularly organised, extra-curricular *Frontiers of Forensic Science* lectures, where they may meet researchers and professional field representatives.

The staff teaching in the programme is composed of 25 teachers, who are professors holding chairs in forensic science sub-fields, scientists from academic research institutes, and forensic examiners or practitioners from other institutes and organisations. Most of them are active researchers in the forensic science field, connecting teaching to their research. 52 % of the teachers have PhDs and 52 % of them are UTQ-certified. Among the staff members who are course coordinators, 75 % have PhDs and 81 % are UTQ-certified. A substantial number of guest teachers, from universities, academic research centres or forensic science institutes, teach in the programme, addressing specialised topics. Two to three teacher meetings are scheduled yearly to discuss the programme and curriculum.

The teaching philosophy in the programme is meant to assist students to become forensic scientists. Students learn both individually and in groups. Teaching, particularly in the first year, is organised in small groups, promoting the active participation of students. Groups are composed of students with different backgrounds to teach them to work in interdisciplinary settings. Students are also trained to develop academic attitudes. The study methods are, among others, lectures, workshops, presentations, practical classes, excursions, and a moot court.

Educational processes and study guidance have been organised to support students going through the programme. Face-to-face education amounts to 12 hours per week in the first year, 10 hours per week in the second year in the courses and 3 supervision hours per week for the Literature Thesis and Research Project. The student-to-staff ratio is about 10 : 1 (33 students and 3.35 FTE of staff). Students are invited to regular meetings during the academic year to receive information on a range of subjects, relevant for to them in the programme. The study advisor of the programme in

collaboration with the programme coordinator monitors students' study progress, provides study advice, in particular on specialisation and elective courses, and refers students to other services, when needed. Students are assisted in finding internships for their Research Projects through the network of programme management and teachers. The student success rate for students graduating within three years was on average 80 % for the last four cohorts. About 40 % of the students managed to complete the programme in two years. The student drop-out rate was on average 9 % for the last four cohorts.

Considerations

The panel in principal supports the programme management policy to restrict the number of incoming students, in view of the number of positions for forensic scientists on the labour market. The panel, on the other hand, advises to estimate the market need more thoroughly. The panel also recommends to explore possibilities to enhance the diversity of disciplines (physics, mathematics, etc.) in the student population. One of the means to arrive at more diversity may be to offer more courses in these disciplines.

The panel evaluates the entry requirements and admission procedures as valid for the programme. These requirements and procedures ensure admitting students who have a reasonable chance to complete the programme.

The curriculum has been logically and coherently structured, and the courses themselves are well-organised. The curriculum design with forensic science courses in the first year and master courses in students' bachelor discipline is adequate. The curriculum is well-aligned with the intended learning outcomes of the programme. The panel, nevertheless, advises to strengthen writing skills as well as advising knowledge and skills in the curriculum, the latter including the methodology of forensic science advising, known as Case Assessment and Interpretation (CAI). In addition, the panel recommends to clarify what is being taught about law and different legal systems, how and in which courses practical law training is covered and which guest lecturers address which law-related subjects and to evaluate whether this is sufficient. The panel also advises to consider developing independently the subjects of digital forensic science and data science from the *Cybercrime, Digital Traces & Forensic Data Analysis* course. The panel notes the practical training in the curriculum to be less developed, meaning not only in terms of practical training in laboratory environments, but also in terms of opportunities to write forensic examination reports and forensic advise reports.

The panel regards the staff as very much suited to teach in this programme, teachers coming from various backgrounds and being able to cover a range of relevant subjects. Teaching qualifications of the teachers are up to standard, as 52 % of them are UTQ-certified. As 52 % of the teachers have PhDs, the academic qualifications of teachers are adequate as well. The panel welcomes teachers being involved in research, as students are familiarised with research and new developments in this field. The panel is positive about the guest lecturers in the programme, who address specialist topics.

The panel is positive about the teaching philosophy of the programme and welcomes the fostering of the active participation of students in learning processes and in interdisciplinary groups. In these

groups, students learn to work interdisciplinary, meeting with fellow students from different backgrounds. The study methods adopted are quite diverse and are instrumental in promoting the learning processes of the students.

Students in the programme are informed, as regular information meetings are scheduled for them. The panel is generally positive about the student guidance in the programme, as provided by the study advisor and programme coordinators. Study progress is monitored adequately and the student success rates and the student drop-out rates of the programme are favourable. Although in the second year of the programme students are offered opportunities to meet, contact moments with fellow students are clearly much less frequent than in the first year. The panel advises to inform students better about the second year and to intensify student meetings and study guidance in this year. In addition, the panel recommends to implement more robust procedures to find internships for Research Projects, for instance by scheduling events where students can meet representatives of organisations offering internships. The panel is rather concerned about students of this programme having difficulties to gain access to biomedical courses of the faculty.

Assessment of this standard

These considerations have led the assessment panel to assess the programme to meet Standard 2, Teaching-learning environment.

3.3 Standard 3: Student assessment

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| The programme has an adequate system of student assessment in place. |
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Findings

The examinations and assessments in this programme are governed by the University of Amsterdam Assessment Policy Framework and the Faculty of Science Testing Framework. The guidelines have been laid down in the Teaching and Examinations Regulations of the programme and in the Rules and Regulations of the Examinations Board. The Examinations Board has been installed dedicated for this programme. This Board has the authority to monitor and assure the quality of examinations and assessments of this programme.

The assessment plan for the programme is the elaboration of prevailing rules and regulations and specifies the steps examiners are to take in drafting, supervising, reviewing and assessing examinations. In accordance with this plan, examiners are required, among other things, to draft course manuals, specifying the course examinations and the final grade calculation rules, to construct test matrices, to have examinations peer-reviewed by colleagues, to draft answer models for written examinations and standardised grading forms for presentations and assignments, and to check written assignments for fraud or plagiarism.

The principle of continuous assessment is at the basis of course examinations and assessments, in order to assure all knowledge, understanding and skills components in the courses to be tested. All of the courses are, consequently, assessed by means of multiple examination components. The final grade for courses is the weighted average of the constituent examination components. These components come in the form of different examination methods, including written examinations, essays, presentations, discussions, portfolios, expert reports, case reviews, literature reviews, and scientific research proposals.

As has been said, the final Research Projects of the programme are individual, scientific research projects. They have to be written in scientific article format. Students may only start their Research Project upon approval of the project proposal by the course coordinator. The supervisor, who is the staff member of the university or of one of the forensic science institutes, guides the student through the process of drafting the research proposal, doing the research and writing the report. PhD students at universities may also act as supervisors. Student and supervisor tend to have meetings weekly. The examiner of the project, who has not been involved in the Research Project process, assesses the project. Halfway through the project, student, supervisor and examiner meet for the midterm evaluation of the project. This may lead to the extension of the project, when the progress is insufficient. Under normal circumstances, the outcome of the midterm evaluation is no surprise for students, as supervisor and student will have discussed any problems in their weekly meetings. Any positive outcome of the midterm evaluation is no guarantee for passing the project at the end. For the final assessment of the Research Project, the examiner asks the supervisor to give advice. The final grade of projects is determined on the basis of the research proposal (10 %),

experimental work (30 %), report (40 %), and oral defence (20 %). For each of these components, series of criteria have been formulated on the basis of which the grades are given.

The Examinations Board has taken measures to assure the quality of examinations and assessments in the programme. The Board appoints the examiners for the courses. Each year, the Board checks the files of three to four courses, checking the correspondence of examinations and course goals, the examination methods used, and the grading procedures adopted. In addition, the Examinations Board each year reviews three Research Project reports. The Board approves individual study plans of students, specially the specialisation or elective courses students want to take in the second year. The Board also handles cases of fraud or plagiarism. One of the intentions of the Examinations Board is to arrange for the examination and assessment quality assessment at programme level.

Considerations

The panel approves of the examination and assessment procedures for this programme, which correspond to university and faculty guidelines.

The panel is positive about the assessment plan, as this plan specifies steps examiners have to take in examination and assessment processes and, thereby, assures the quality of these processes.

The continuous assessment principle is favourable, in the sense of assuring all aspects of students' performances to be assessed. The examination methods adopted in the courses meet the course goals. The students are appropriately informed about the procedures and grading of examinations.

In the panel's view, the procedures for the supervision and assessment of the Research Projects are up to standard. The supervision of these projects with weekly meetings of students and supervisors is well-organised. The approval of the Research Project proposal and the midterm evaluation allow for monitoring the progress of students. The involvement of the independent examiner is effective to arrive at reliable assessments. Although the panel welcomes the standardised Research Project assessment form, the list of criteria is seen as too extensive, not clearly distinguishing criteria in terms of importance and tending to lead to levelling of final grades. The panel, therefore, advises to reorganise the form, limiting the list to crucial criteria and allowing for more spread of final grades.

The panel considers the measures adopted to monitor and assure the quality of examinations and assessments to be up to standard. The Examinations Board is solid and active in performing their duties. The Board's activities are in line with prevailing rules and regulations. The panel supports the intention of the Board to arrange for the examination and assessment quality assessment at programme level, and recommends to prioritise the plans to effectively execute this.

Assessment of this standard

These considerations have led the assessment panel to assess the programme to meet Standard 3, Student assessment.

3.4 Standard 4: Achieved learning outcomes

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| The programme demonstrates that the intended learning outcomes are achieved. |
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Findings

The panel studied the examinations of courses of the programme. The panel also reviewed fifteen Research Projects of graduates of the programme of the last two years. The projects cover a range of areas within the forensic science field, such as forensic medicine, biometrics, crime scene science, forensic chemistry, or forensic data science. The average grade for the projects rose from 7.5 to 8.0 over the last five years. Since the start of the programme, about 21 % of the programme graduates managed to have their Research Projects published. Before the article format was made compulsory, this percentage was 18 %. Since the introduction of the compulsory scientific journal article format, the proportion of published Research Projects rose to 24 %.

On the basis of the figures for all graduates of the programme since the start of the programme in 2005, it may be said graduates tend to find positions quite easily but not always in the forensic science field. Five years after graduation, about 40 % of the graduates are employed by companies or research institutes or are pursuing PhD trajectories outside of the forensic science field. About 40 % of the graduates found forensic science related positions, 30 % working in the forensic science practice, 1 % being involved in forensic science education and 9 % having positions as PhD students in the forensic science field.

Considerations

The quality and the level of the course examinations, which the panel reviewed, are up to standard. The panel regards the examinations to conform to and to test appropriately the goals of the courses.

The Research Projects the panel studied, meet the intended learning outcomes. The panel evaluates the grades given by the programme examiners as fair. The panel agrees with the grades, with the exception of two rather low-graded projects, which were slightly too high graded. No projects were found to be unsatisfactory, though some projects failed on some assessment criteria. The topics addressed in the projects are interesting, the research is done well, and the presentation is adequate, although writing skills need attention. Some projects are evaluated by the panel as very good. The quality and academic level of the projects meet master level requirements in the field of forensic science.

The positions, which graduates of this programme manage to secure, showcase the results these graduates have achieved at completion of this programme.

Assessment of this standard

These considerations have led the assessment panel to assess the programme to meet Standard 4, Achieved learning outcomes.

4. Overview of assessments

| Standard | Assessment |
|---|----------------------------|
| Standard 1. Intended learning outcomes | Programme meets Standard 1 |
| Standard 2: Teaching-learning environment | Programme meets Standard 2 |
| Standard 3: Student assessment | Programme meets Standard 3 |
| Standard 4: Achieved learning outcomes | Programme meets Standard 4 |
| Programme | Positive |

5. Recommendations

In this report, a number of recommendations by the panel have been listed. For the sake of clarity, these have been brought together below.

- To reconsider the term expert in the graduation profiles as, strictly speaking, this term is attributed to scientists appointed specifically by legal authorities within particular cases.
- To estimate the market need for forensic scientists more thoroughly and to bring the number of admitted students in line with this estimate.
- To explore possibilities to enhance the diversity of disciplines (e.g. physics, mathematics) in the student population.
- To strengthen writing skills and advising knowledge and skills in the curriculum, the latter including the methodology of forensic science advising, known as Case Assessment and Interpretation (CAI).
- To clarify what is being taught about law and different legal systems, how and in which courses practical law training is covered and to evaluate whether this is sufficient.
- To consider developing independently the subjects of digital forensic science and data science from the *Cybercrime, Digital Traces & Forensic Data Analysis* course.
- To inform students better about the second year of the programme and to intensify student meetings and study guidance in this year.
- To implement more robust procedures to find internships for Research Projects, for instance by scheduling meeting events for students and representatives of organisations offering internships.
- To reorganise the Research Project assessment form, limiting the form to crucial criteria and allowing for more spread of final grades.
- To prioritise the plans of the Examinations Board to effectively execute the examination and assessment quality assessment at programme level.

Appendix: Assessment process

University of Amsterdam requested evaluation agency Certiked VBI to support the limited framework programme assessment process for the Master Forensic Science programme of this University. The objective of the programme assessment process was to assess whether the programme conforms to the standards of the limited framework, as laid down in the NVAO Assessment framework for the higher education accreditation system of the Netherlands of September 2018 (officially published in Stcrt. 2019 no. 3198, on 29 January 2019).

The programme was assessed stand-alone, i.e. not being part of one of the assessment clusters of programmes, as defined by NVAO.

Management of the Master Forensic Science programme drafted the list of candidates for the assessment panel. Certiked invited candidate panel members to sit on the assessment panel. The panel members agreed to do so.

The panel composition was as follows:

- Prof. dr. D. Meuwly, full professor, University of Twente; principal scientist, Netherlands Forensic Institute, the Netherlands (panel chair);
- Prof. dr. A. Biedermann, associate professor, University of Lausanne, Switzerland (panel member);
- Mr. drs. H. van den Heuvel MBA, senior judge, The Hague Court of Appeal; chair National Expert-group Forensic Expertise, the Netherlands (panel member);
- M.D. de Ruiten MSc, recently graduated student Master Bio-Pharmaceutical Sciences, Leiden University, the Netherlands (student member).

On behalf of Certiked, W. Vercouteren served as the process coordinator/secretary in the assessment process.

All panel members and the process coordinator/secretary confirmed in writing to have no conflict of interest with regard to the programme to be assessed and to observe the rules of confidentiality. Having obtained the authorisation by University of Amsterdam, the process coordinator/secretary requested the approval of NVAO of the panel to conduct the assessment. This approval was given.

To prepare for the programme assessment, the process coordinator/secretary met with Master Forensic Science programme management to discuss, among other things, the outline of the self-evaluation report, the subjects to be addressed in this report, and the site visit schedule, and the planning of activities in preparation of the site visit. In the course of the process, programme management and the process coordinator/secretary had contact to monitor and fine-tune the process. The activities were performed as planned. Programme management approved the schedule for the site visit.

Well in advance of the site visit date, programme management sent the complete list of the final Research Projects of students graduated from the programme during the two most recent years (all

students graduated from October 2020 to November 2022). Acting on behalf of the assessment panel, the process coordinator/secretary selected fifteen projects from this list. The grade distribution in the selection made corresponded to the grade distribution in the list forwarded by programme management, containing Research Projects with a variety of grades.

Well in advance of the site visit, the programme self-evaluation report including appendices was sent to the panel members. In this report, the four standards of the NVAO Assessment framework were discussed. The student chapter was part of the report. The appendices to the self-evaluation report contained the following information.

- List of improvements, following the previous assessment
- Domain-specific framework Forensic Science
- Graduation profiles
- Intended learning outcomes
- Relations of intended learning outcomes to Dublin descriptors, to learning trajectories objectives, and to curriculum
- Overview of visual learning trajectories and learning trajectories objectives
- Overview curriculum
- Overview courses
- Teaching philosophy
- Overview teaching staff (fields of expertise, positions, titles, BKO/SKO qualifications)
- Guest lecturers and topics
- Student statistics (number of incoming students over five most recent years, student success rates for four most recent cohorts, student-to-staff ratio, hours of face-to-face education)
- Education and Examination Regulations 2022/2023
- Assessment plan
- Impact Covid-19
- Cooperation with Co van Ledden Hulsebosch Center
- Teaching Committee annual reports over three most recent years
- Examinations Board annual reports over last three years
- Course material and course examinations
- Programme annual report 2023

Panel members studied a number of Research Projects of programme graduates, the total of these projects making up the selection made by the process coordinator/secretary.

Before the site visit, the panel chair and the process coordinator/secretary discussed the procedures with respect to the assessment process. The panel chair was also informed about the competencies, listed in the profile of panel chairs of NVAO. The meeting between the panel chair and the process coordinator/secretary served as the briefing for panel chairs, as meant in the NVAO profile of panel chairs. The panel chair agreed to work in line with the profile of panel chairs.

The panel members were sent the Trained Eye document of Certiked evaluation agency, this document being the explanation of the NVAO Assessment framework.

Prior to the site visit date, all panel members sent in their preliminary findings, based on the self-evaluation report and Research Projects studied, and forwarded a number of questions to be put to programme representatives on the day of the site visit. The process coordinator/secretary summarised this information, compiling a list of questions, which served as a starting point for the discussions during the site visit.

On 16 March 2023, the panel met to go over the preliminary findings concerning the quality of the programme. During this meeting, the preliminary findings of the panel members, including those about the Research Projects were exchanged. The procedures to be adopted during the site visit, including the questions to be put to the programme representatives on the basis of the list compiled, were also discussed.

On 17 March 2023, the site visit was conducted on the Faculty of Science campus of University of Amsterdam. The site visit schedule was in accordance with the schedule as planned.

The site visit schedule included the following meetings.

- 09.00 – 09.40 Vice-Dean, director Institute for Interdisciplinary Studies, programme director
- 09.50 – 10.45 Programme director, programme coordinator, core lecturers, study advisor
- 11.00 – 11.30 Examinations Board
- 11.30 – 12.00 Open-office hours
- 12.00 – 12.30 Panel lunch (closed session)
- 12.30 – 13.15 Lecturers, final Research Projects' examiners
- 13.15 – 14.00 Students, with programme committee student members, programme alumni
- 14.15 – 14.45 Professional field representatives
- 14.45 – 16.15 Deliberations panel (closed session)
- 16.15 – 16.30 Presentation main findings by panel chair to programme representatives
- 16.30 – 17.00 Development dialogue between panel and programme representatives

Open-office hours were communicated in a timely fashion by programme management to staff, lecturers and students of the programme. No-one, however, came forward to make use of these open hours.

In a closed session at the end of the site visit, the panel considered all of the findings, weighed the considerations and arrived at conclusions with regard to the quality of the programme. At the end of the site visit, the panel chair presented the broad outline of findings, considerations, assessments and recommendations to programme representatives.

At the end of the site visit and clearly separated from the process of the programme assessment, panel members and programme representatives met to conduct the development dialogue. The objective of this dialogue was to discuss future developments of the programme.

The assessment draft report was finalised by the process coordinator/secretary, taking into account the findings, considerations, assessments and conclusions of the panel. The draft report was sent to the panel members, who studied it and made a number of changes. Thereupon, the secretary edited

the report. This report was then presented to programme management to be corrected for factual inconsistencies. Programme management were given two weeks to respond. Having been corrected for factual inconsistencies, the final report was sent to the University Board to accompany their request to continue the accreditation of this programme.