ONDERZOEKERIJ

Research Master Infection and Immunity

Erasmus University Rotterdam

Report of the limited programme assessment

De Onderzoekerij
Vondellaan 58
2332 AH Leiden

Email: info@onderzoekerij.nl
Internet: www.onderzoekerij.nl

Contents

Executive summary

The outcome of the external assessment of the research master's programme Infection and Immunity (I&I) of Erasmus University Rotterdam (EUR) by an NVAO approved panel is positive.

The two-year full-time programme aims to train excellent students to become esteemed researchers in the field of infection and immunity, capable of 'translating' basic science into clinical medicine and population/public health and vice versa. The emphasis on research skills as well as other academic skills clearly demonstrate the programme's research master's orientation. The I&I programme distinguishes itself by offering a research master's programme with a singular focus on infection and immunity. Based on the shared framework for all five research master's programmes offered by Erasmus MC, the programme formulated ten intended learning outcomes (ILOs). The panel advises formulating the learning outcomes in a more specific and ambitious way. In addition, the ILOs should be updated by integrating the attention the programme pays to the development of transferable skills.

The curriculum is an appropriate reflection of the intended learning outcomes, providing a good balance between theoretical courses, skills courses, and intensive hands-on training in research. However, the panel advises to ensure that the ILOs are distributed in a well-balanced way throughout the different courses of the programme.

The research orientation of the curriculum is beyond dispute. The panel is positive about the level and the content of the courses. However, the programme would benefit by integrating statistics and bioinformatics in a more structured way. The panel advises to make the current elective course on bioinformatics compulsory for all students. In addition, it advises to replace the compulsory course SPSS by a course on R and integrate this with a broader compulsory course on statistics. These courses should be assigned sufficient EC.

The panel highly appreciates the two research internships in the curriculum. Students perform their first internship always within Erasmus MC and can choose to do their second research internship at another university in the Netherlands or abroad. The panel values this opportunity for students to get a broader work experience and larger network, in preparation for their further career. A point of attention is the flexible length of the internships. The panel thinks it is important to protect students from any pressure to extend their internship. It recommends setting a fixed deadline and creating a timetable that specifies the time the student will spend on the internship which must be approved by the supervisor and the programme management. The number of EC should match with the actual time spent on the internship.

The main didactical concept of interactive and personalized training using the apprenticeship model fits well with a research master's programme. The panel advises the programme to further elaborate, explicate and implement the didactic concept aimed at activating interactive education that pays attention to the personal and professional development of students.

The programme is highly selective and carefully looks for a good match between prospective students and the programme. This results in a group of motivated and well-performing students. However, the panel advises to make the selection procedure more transparent and communicate clearly on which criteria students are ranked and selected.

The programme clearly is embedded in the Theme Diagnostics and Advice of Erasmus MC. The panel thinks highly of the staff members, many of whom are acknowledged scientists in their field. The panel also considers the lecturers to be very committed. The panel was concerned that the teaching staff is currently not rewarded by financial compensation and support of their professionalisation. The panel

was relieved to hear that there are concrete plans to change this soon and that the necessary funding will be made available.

The programme has a satisfactory framework for assessment and makes use of an appropriate range of assessment methods, including written exams with open (essay) questions, assignments, and presentations. The panel is impressed by the thoughtful and extensive process to safeguard the quality of the master's theses. It also highly values the rebuttal students write in response to the feedback they receive.

The Chamber Research Masters of the Examination Board Erasmus MC (CRMEB) is responsible for the examination and assessment quality of the programme. Although the panel is confident that the CRMEB is well equipped and positioned to safeguard the quality of the assessments, a lot of work remains to be done. It encourages the programme management to prioritise the assessment carrousel to ensure and improve the quality of the assessment.

The panel is positive about the high quality and academic level of the fifteen theses it examined. This indicates that the students are well-prepared for a PhD position. Alumni also indicated to feel well-prepared for a job as a researcher. The panel advises to pay more attention to career paths outside academia because this will allow students to make an educated and motivated decision about their future career.

The chair and the secretary of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 18 February 2022

Frans Ramaekers	Esther Poort
(chair)	(secretary)

1. Introduction

1.1 Administrative data

Name of the programme:	M Infection and Immunity (research)
CROHO number:	60375
Level of the programme:	Master of Science
Orientation of the programme:	Academic
Study load:	120 EC
Location:	Rotterdam
Variant:	Full-time
Submission deadline:	1 May 2022

1.2 Introduction

This report focuses on the assessment of the research master's programme Infection and Immunity of the Erasmus University Rotterdam. This assessment forms part of a cluster assessment of six research master's programmes at three universities. The cluster was divided into two subclusters, each consisting of three programmes: a health cluster and a molecular cluster. Appendix A provides an overview of the six participating research masters programmes and the composition of the total panel.

The assessment is based on the standards and criteria described in the NVAO Assessment Framework for the Higher Education Accreditation System of the Netherlands 2018 (limited framework). Research master's programmes must meet several additional criteria as described by the NVAO (specification of additional criteria for research masters programmes, 2016).

1.3 Panel composition

In total, seven panel members participated in this cluster assessment. Three panel members participated in all assessments (the core panel). In addition, each cluster subpanel included two extra panel members (see Appendix A). The panel that assessed this research master's programme consisted of the following members:

- Prof. Frans Ramaekers (chair), professor emeritus Molecular Cell Biology, Maastricht University;
- Dr. Jolanda van der Zee, associate professor in Education of Biomedical Science and Medicine, Leiden University;
- Prof. Marieke van der Schaaf, professor of Research and Development of Health Professions Education, University Medical Center Utrecht;
- Prof. dr. J. (John) Creemers, professor of Biomedical Science, KU Leuven;
- V.E.J.M. (Victoria) Palasantzas MSc, student M Molecular Medicine and Innovative Treatment (research), University of Groningen (graduated in 2021).

The panel was supported by drs. Esther Poort, who acted as secretary.

All panel members and the secretary have signed a declaration of independence and confidentiality. In this declaration they affirm not to have had any business or personal ties with the programme in question for at least five years prior to the review.

The NVAO approved the composition of the panel on 25 May 2021.

1.4 Working method

Preparation

On 28 June 2021, the panel of the entire cluster held a general online kick-off meeting. In this meeting, the panel received an introduction to the assessment framework and discussed the working methods in preparation to and during the site visits.

The programme drew up a self-evaluation report describing the programme's strengths and weaknesses. This self-evaluation report included a chapter in which the students reflected on the programme. The panel members prepared the assessment by analysing the self-evaluation report and the appendices provided by the institution. The panel also studied a selection of fifteen master's theses and the accompanying assessment forms from the programme. The theses selection was made by the panel's secretary based on a provided list of at least thirty theses of the most recent years. In the selection, consideration was given to a variation in assessments (grades) and topics.

The panel members individually formulated their preliminary findings and a number of questions they wanted to raise during the site visit. The secretary made an overview of these preliminary findings and questions and sent it to the panel members as a starting point for the preparation of the panel during the site visit.

Visit

The site visit took place on 25 and 26 November 2021 (see Appendix B for the schedule). During the preparatory meeting, the panel discussed the preliminary findings and decided which questions to raise in their meetings with the programme representatives. During the visit, the panel spoke with representatives of the management, students and alumni, lecturers, and Examination Board. Everybody involved in the programme had the opportunity to inform the panel in confidence about matters they considered important to the assessment. No one made use of this opportunity. The panel used the last part of the visit to evaluate the interviews and had a second meeting with the programme's management to receive answers to any remaining questions. At the end of the visit, the chair presented the panel's preliminary findings and impressions of the programme.

Report

The secretary drew up a draft report based on the panel's findings. This draft report was presented to the members of the panel and adjusted based on their feedback. After adjustments, the draft report was sent to the institution for verification of factual inaccuracies. The secretary discussed the programme's comments with the chair, after which the secretary drew up the final report and circulated it to the panel for a final round of comments.

The report follows the four standards of the NVAO's Assessment Framework 2018 (limited framework): 1) the intended learning outcomes, 2) the teaching-learning environment, 3) assessment, and 4) achieved learning outcomes. Regarding each of the standards, the assessment panel gave a substantiated judgement on a three-point scale: meets, does not meet, or partially meets the standard. The panel subsequently reached a substantiated conclusion regarding the quality of the programme, also on a three-point scale: positive, conditionally positive, or negative.

Development dialogue

Although clearly separated from the process of the programme assessment, the assessment panel members and programme representatives will conduct a development dialogue in early 2022, with the objective of discussing future developments of the programme in light of the outcomes of the assessment report.

2. Review

2.1 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, analysis, and considerations

The research master's programme Infection and Immunity (I&I) is one of the five research master's programmes offered by Erasmus Medical Centre (Erasmus MC). The main aim of I&I is to train excellent students to become esteemed researchers in the field of infection and immunity, capable of 'translating' basic science into clinical medicine and population/public health and vice versa. The I&I programme combines training in fundamental and advanced immunology, virology, and microbiology with training in clinical and population-based research. One important competency that students need to acquire is the ability to effectively collaborate within and outside the research group.

The programme has compared itself to other master's programmes in the field of biomedical research in the Netherlands. According to the critical reflection, I&I distinguishes itself by offering a research master's programme with a singular focus on infection and immunity. The programme also distinguishes itself by admitting a mix of biomedical and medical students and by its international focus. The panel acknowledges that this profile makes the programme unique in the Netherlands.

The programme clearly leverages on its setting in which it is embedded in the Theme Diagnostics and Advice of Erasmus MC. Many faculty is associated with one of the departments of this Theme, most notably Viroscience, Medical Microbiology & Infectious Diseases, and Immunology. In addition, a significant number of the faculty is associated with other relevant departments of Erasmus MC. The involvement of senior researchers and teachers with a leading international reputation in their field ensures that the programme is geared to the expectations of the professional field, the discipline, and international requirements.

The five research master's programmes of Erasmus MC have developed a shared framework of intended learning outcomes (ILOs). In general, these ILOs aim to offer a solid basis for a research career. Each research master's programme has further elaborated these general ILOs to fit its specific profile. In the case of I&I, the focus is on the domain of infection and immunity, in fundamental as well as applied research and related to human infection and immunity.

The panel verified the relationship between the ten ILOs formulated by I&I and the Dublin descriptors. It observed that all Dublin descriptors are evident in the ILOs. The emphasis on research skills as well as other academic skills testifies to the programme's research master's orientation. Overall, the panel is of the opinion that the ILOs of I&I fulfil all requirements in terms of content, level, and orientation. However, the panel thinks that the current formulation does not do full justice to all specificities and objectives of this well-thought-out master's programme. The panel advises updating several learning outcomes so that they are better aligned with the content of the curriculum. First, there is room for improvement for formulating the learning outcomes in a more specific and ambitious way. For example, the panel would have expected more references to complex skills like analysing, synthesising, and evaluating literature, or to issues regarding scientific integrity and open science. Based on the written documentation and the discussions with staff and students, the panel noted that these are indeed

present in the programme. Similarly, the panel advises updating the ILOs by integrating the development of transferable skills. This would do better justice to the training and assessment of students on elements such as attitude, independence, decisiveness, and organisational skills.

The panel fully agrees that the programme should primarily have an academic focus. However, the panel suggests evaluating and eventually rephrasing the ILOs to better reflect the orientation on research outside academia. According to the critical reflection, students must discover during the programme if they wish to pursue a research career in academia, combine a career in research with a medical career (physician-scientist), or pursue a career in industry and/or a career in management. The panel, therefore, advises that the programme should strengthen the orientation on a (research) career outside academia. It thinks it is important to make students fully aware that the knowledge and skills they acquire during the research master's programme, and possibly deepened during a PhD, are very valuable in non-academic settings as well.

Conclusion

The intended learning outcomes fulfil all requirements in terms of content, level, and orientation. The programme therefore meets standard 1.

2.2 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, analysis, and considerations

Curriculum

The I&I research master's programme is a full-time programme of 120 EC, divided into four semesters. The curriculum consists of mandatory core courses (41,8 EC), two research internships (53,2 EC total), electives (13 EC) and visits to research labs (12 EC).

The panel is of the opinion that there is an adequate balance between theoretical courses, skills courses, and intensive hands-on training in research. The research orientation of the curriculum is beyond dispute. The panel considers the curriculum to be an appropriate reflection of the intended learning outcomes of the programme. Based on the schedule provided in the critical reflection, the panel established that the distribution of the ten ILOs over the different courses is not well-balanced. It advises to evaluate this schedule critically and to ensure that the ILOs are distributed in a well-balanced way throughout the courses.

In the Summer Course of the first semester (SC 1) students acquire basic theoretical knowledge in immunology, virology, and microbiology. In addition, students follow several small courses in practical skills, including biomedical research techniques, statistics, and writing. The Winter Course in the second semester (WC I) covers more specific subjects in the field of I&I aimed at the human body, which comprise basic and advanced organ-specific immunity, emerging infectious diseases and transmission of viruses, transplant immunology, anti-microbial resistance, and clinical pharmacology. The two courses in the second year (SC II and WC II) provide more advanced theoretical knowledge and knowledge on applied subjects in the I&I field. During the entire first year, students also engage in lab visits, which allows students to get in touch with researchers from I&I and to choose their research

internships. The allocated 12 EC also include acquisition of specific knowledge of the areas of research, the presentation of the plan for the first research internship and the writing of the research proposal of the second internship.

The panel is positive about the level and the content of the courses. However, the programme would benefit from a further alignment of the courses. In particular, the panel advises to integrate statistics and bioinformatics in a more structured way into the curriculum. The panel feels that it is important that research skills which are typically expected from a research master's student have already been covered prior to internships. The panel suggests making the current elective course on bioinformatics compulsory for all students. In addition, the current compulsory course on SPSS could be replaced by a compulsory course on 'R' and integrated with a compulsory course on statistics. The panel advises to assign sufficient EC to these courses and suggests redistributing some of the 12 EC that are currently allocated to 'Visiting research labs'.

The panel highly appreciates the two research internships in the curriculum. At the start of each academic year, the programme issues a full description of all possible research projects, the Research Bible. This document contains about 55 Research Projects from about 65 researchers. Scholarly repute is an important criterion for the projects in the Bible. A student can choose a project from the Bible but can also find another project that fits into the I&I programme and is approved by the Programme Director.

The first internship must always be performed within Erasmus MC to allow close supervision of the lab skills and, more generally, the scientific capacities of the student. For their second research project, students can choose to go to another university in the Netherlands or to go abroad, whilst being supervised by a teacher of Erasmus MC. For every project outside Erasmus MC, the student's external supervisor should have close connections with at least one researcher within Erasmus MC. The panel values this opportunity to gain research experience outside Erasmus MC, allowing students to get a broader work experience and larger network, in preparation for their further career. About three to four students per year take the opportunity to go abroad. The panel encourages the programme management to further stimulate students to go abroad for this second internship.

A point of attention is the length of the internships. The first research project takes place in the second half of the first year (for five months) and the second research project takes place in the second year (for ten months), but the length of the projects can vary. As described in the student chapter, students are supposed to decide the duration of the internship period themselves, in agreement with their supervisor. Students are allowed to extend their research project during the holiday months, for which they get extra EC (electives). Students indicated they are inclined to do this, also because this will relieve the burden of electives. The panel noted that students also perceive some peer pressure and pressure from their supervisor to continue their internship during their summer holiday. This not only has the consequence of students working in their department without taking time off, but it can also lead to an overlap with the second internship. Both in the student chapter and during the interview, students indicated that they would prefer a fixed deadline. The panel learned during the site visit that the programme is aware of this and therefore recently implemented the rule that students can extend their internships with a maximum of two weeks. Although the panel understands the wish to allow some flexibility, the panel believes that it is more important to protect students from any pressure to extend their internship and recommends to set a fixed deadline. The panel is also not convinced that extending the internship with two weeks is of added value to the students' learning goals. Moreover, the panel noted that students do not know how to translate the number of EC into the actual time they are expected to spend on the internship. The panel advises to communicate this more clearly.

Next to their internship, students follow elective courses. Currently, many elective courses are offered by MolMed (the 'old' Molecular Medicine Research School; now incorporated in the Graduate School as 'Biomedical Domain'). Students are also free to choose their electives from other research master's programmes within Erasmus MC, courses of other research schools, and courses at another university in the Netherlands, if relevant to the I&I realm and/or their research project. These courses offer students a good opportunity to gear the programme to their specific needs and research interest. The supervisor guides the student in the choice of the elective. During the site visit, staff, students and alumni indicated that it depends on the supervisor how much guidance students receive. Based on the student chapter, the panel noted that students appear not to be aware of the broad range of courses they can choose from. The panel encourages the programme to offer students more guidance in what electives to choose and provide students timely with the information they need.

Students and alumni indicated that the supervisor is not always aware that they have to follow courses parallel to the internship and are therefore not supposed to work fulltime on their research project. Students would like more support on this, for example by providing the supervisor with a guideline about the rules and requirements of the courses in combination with the internship. The panel suggests creating a timetable that specifies the time the student will spend on both the internship and the courses and also indicates a clear start and end date. This timetable could be included in the research proposal and should be approved by the supervisor and the programme management. The number of EC should match with the actual time spent on the internship.

Next to their internship, students also attend Journal Clubs (JCs) once every two weeks. In every JC two publications are presented by two students, and every student must study the publications in advance. The panel appreciates these JCs as they offer a good opportunity to practice critical thinking.

The I&I programme has deliberately chosen an English programme name and English as the language of instruction. The programme management substantiates its choice by arguing that the use of English not only facilitates an international classroom, it also allows the international staff, working at Erasmus MC, to thoroughly convey their knowledge. This provides students with the opportunity to get in touch with a broad range of researchers in an international field, which also shows from the encouragement to spend time abroad for research. The panel supports this choice. Since the language of science is English, the programme requires each staff member to speak English fluently. All teachers present their data on international conferences, publish in peer-reviewed (English) international literature, and write international grant applications.

Admission and student population

The I&I research master is open for students with an academic bachelor's degree in a life sciences discipline, such as a bachelor's degree in medicine, biology, biomedical sciences, (bio)chemistry, or related studies. The master is also open for non-academic students with a bachelor's degree from laboratory colleges (universities of applied sciences) or equivalent. International applicants whose native language is not English should submit the official score of either one approved English language proficiency test, or a proof that the previous education was in English.

The panel established that the programme is highly selective in admitting students. The programme places substantial weight on student motivation in the selection process and carefully looks for a good match between the scientific potential of prospective students and the programme. On average, the programme receives about 70 applications per year. Applicants need to submit a motivation letter, certified copies of diplomas and grades and two recommendation letters. Additionally, applicants from a university of applied sciences need to add a recommendation letter from their institution.

After an initial selection by the Programme Director and teachers, students with the best motivation letters and the strongest record (about 60-70%) are invited for a 20-minute interview. All interviews are conducted by the Programme Director, together with two rotating teachers. In this interview the applicants' motivation is checked, as well as their spoken English and their knowledge and understanding of some crucial elements are checked. All applications are graded by the Programme Director and teachers, resulting in a ranked list. The 25 highest ranking applicants are invited to join the programme and about 20 students actually start the programme.

The panel appreciates the substantial weight on student motivation in the selection process and the careful procedure to see if there is good match between the prospective student and the programme. This results in a group of motivated and well-performing students. However, the panel advises to make this procedure more transparent and communicate clearly on which criteria students are ranked and selected.

The programme has a diverse student population. Students have various nationalities and educational backgrounds. This offers good opportunities for students to learn from one another and to gain new perspectives on knowledge, technology, and culture. In the period 2017-2020, the programme had 28 international students out of a total of 73 (38%). The panel highly values the scholarships that are granted to some excellent students from low-income countries. The programme has particularly strong relations with Bangladesh. Every year, one of the admitted students from Bangladesh receives a grant from the programme. The panel also highly appreciates the establishment of a foundation for I&I to rent out 26 affordable, furnished student rooms to mainly international students. Students from other Erasmus MC research master's programmes are also able to apply to this foundation for housing.

Didactical principles

One of the main didactical principles is the focus on interactive and personalised training using the apprenticeship model. The panel is of the opinion that this didactical concept fits well with a research master's programme. After studying the curriculum, it also recognised aspects of this principle in the programme. In general, there is room for informal interaction between the staff and students, and students value the fact that they are educated by high-level researchers in the field. However, the panel noted that the programme would benefit from a further elaboration of this didactical principle. For example, the programme could stimulate more active involvement of students during classes. Especially the Summer and Winter Courses have a rather classical way of teaching, consisting mainly of in-class lectures. The panel is pleased to note that the programme is currently redesigning these courses and intends to use more forms of blended learning and adaptive learning. The panel strongly supports this and advises the programme to elaborate, explicate and implement the didactic concept aimed at activating interactive education that pays attention to the personal and professional development of students.

The critical reflection indicates that the embeddedness in a research environment is also considered to be a main educational principle. The panel appreciates that students are part of the research groups during their research internships and have ample opportunities getting hands-on research experience. In particular, the panel highly values the apprenticeship relationship between students and supervisors. All students and alumni that the panel met, were also very satisfied with the research-oriented nature of the programme.

Study load and study guidance

In the student chapter, students report that I&I is an intense programme with a high level of difficulty due the density of information provided in a short period of time. Students experience the first period as an intensive and difficult period. This was confirmed during the site visit by the students and alumni. The panel encourages the programme management to continue discussing with students how they perceive the study load and monitor their well-being, e.g. by periodic cohort meetings.

This high study load in the beginning of the programme is mainly caused by the fact students have different backgrounds. The first course is designed to get all students to the desired level. Students reported that the management made them aware of this before the start of the programme. After this first very intensive course, the programme becomes less demanding. Both students and alumni agreed that the programme is, however, feasible.

The average time to complete the programme is just over two years. Medical students, who combine I&I with the medical master's, take longer to complete the programme because of their medical internships.

Supervisors oversee students' learning process, discuss their study programme and future career, and provide students with advice and guidance on working in a research setting, using the scientific methods and writing their master's thesis. Supervisors are also an important link for introducing students into the research group. Students can also choose a senior scientist, who is not involved as a supervisor, as a personal tutor. The tutor can guide the student, support the student to integrate in the relevant research environment or encourage his/her personal development. As indicated in the critical reflections, students are aware of this possibility, but they hardly use this opportunity. The panel sees added value in the guidance by a personal tutor and encourages the management to explore what is needed to get students to use this opportunity.

Whenever they experience problems with their study, students can turn to the programme management. Due to the small class sizes, programme management is in close contact with its students, which makes it easy for students to voice their problems. However, students also report in the student chapter that this close contact makes it harder for students to talk about issues they would rather discuss with someone outside the managing team. The panel agrees with this and is pleased with the intention to appoint an independent student advisor who will be available for all students of the Graduate School seeking advice from a counsellor not related to the programme organisation.

Staff

The I&I programme distinguishes between CORE and CORE-2 teachers. The CORE teachers, together with the Programme Coordinator, effectively form the Programme Board. The members of the Programme Board are representatives of I&I's core departments, being Viroscience, Immunology, Medical Microbiology & Infectious Diseases, Pediatrics and Gastroenterology & Hepatology. The Programme Board is responsible for the scientific and didactic programme of the I&I master, the content of the courses, the selection and admittance of students and the assessment of students' final marks. These CORE teachers give lectures in the programme, supervise students during their internships, act as co-reviewers for the internships of students, and assess their internship presentations, master's theses and graduation presentations. CORE-2 teachers give lectures, supervise students during their internships, and assess their internship presentations, master's theses and graduation. They are less involved in programme development than the Programme Board. Apart from the Programme Board and CORE-2 teachers, about 100 teachers from within and outside Erasmus MC lecture in the programme.

The panel met with very qualified and dedicated CORE teachers. The ambitious and small-scale character of the programme adds to the commitment of the teaching staff to the programme and to the motivation to work with the I&I students.

The panel acknowledges the staff's excellent scientific quality and international academic reputation. They are active researchers and able to bring in the latest developments in their field. The excellent research quality of the teachers is evident from last year's positive evaluation of the 47 research departments in Erasmus MC by an international review committee as part of the Standard Evaluation Protocol (SEP). According to this research assessment, the scientific achievements of all thirteen departments involved in I&I were evaluated as very good to excellent. This reputation of the departments is endorsed by the panel. It is clear to the panel that students are part of a high-quality and committed research environment.

Of the 139 teachers involved in the programme, 65% have a (partial) UTQ and 2% have an SUTQ; of the 31 CORE-2 teachers, 84% have a (partial) UTQ and 3% have an SUTQ. The panel encourages the programme to continue improving these numbers.

The panel was concerned that the teaching staff lacked acknowledgement and appreciation because they are not rewarded by financial compensation for their teaching and are to a limited extent supported in their professional development as a teacher. The panel was relieved to hear that there are concrete plans, including the necessary funding, to change this soon.

Graduate School

Newly created in 2021, the Erasmus MC Graduate School is the hub for graduate programmes at both research masters and PhD level. The Scientific Director and the Managing Director consult in the Graduate School Management Team with a representative of the Research Masters and a representative of the PhD branch. According to the self-reflection, the Graduate School is a platform for both existing education, as well as for new initiatives within the convergence of Erasmus MC with TU Delft and Erasmus University Rotterdam. The period ahead will be marked by the structuring of the organisation and better coordination of the five research master's programmes. The panel sees a clear added value in the Graduate School and encourages the programme to optimally utilise this hub to explore where the research master's programmes can strengthen each other.

ECRM

The Education Committee Research Masters (ECRM) consists of students and teachers from the five Research Masters. The ECRM advises the programme on matters relating to quality assurance of the programme and approves the Teaching and Examination Regulations. The panel noted during the site visit that the ECRM is involved in the development of the programme, but that this involvement could be more formalised.

COVID-19

Whilst COVID-19 evidently had an impact on the interaction between students and teachers, both were positive about the quick and efficient transition. The panel compliments the programme management for paying close attention to the mental health of students during COVID-19.

The programme had to downscale the number of lectures that were given on campus and increase the focus on blended learning. The programme aimed to maximise the number of live sessions within the

COVID-19 restrictions imposed. With small groups of approximately 20 students per year and access to a room that could fit 25 persons at a 1.5 m distance, the lectures in SC I (year 1) and SC II (year 2) were alternatingly given live and online. With the complete lockdown later in the year, all lectures of WC I and WC II had to be given online.

In 2020, the lab rotation was also affected due to COVID-19. The programme found a creative solution to organise this in a different way. Students also found alternative and satisfying ways to conduct their research during the internship.

The panel concluded that although the COVID-19 situation is not an optimal teaching and learning situation, the programme still allows students to achieve the intended learning outcomes. It suggests the programme to explore what measures might be kept after COVID-19 and how this could be further improved.

Conclusion

The panel concludes that the programme fulfils all specific requirements for the teaching and learning environment of a research master's programme and therefore meets standard 2.

2.3 Student assessment

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

The panel noted that the programme has a solid set of documents and procedures in place which secure an adequate assessment system. The critical reflection reports that the constructive alignment of learning objectives, learning activities and assessments is the key principle of the assessment system. The educational policy underlying the assessments is described and fully documented in the 'Assessment Policy and Assessment Plan MSc Infection and Immunity'. This document also describes the relationship with the learning outcomes and Dublin descriptors.

The programme uses a good variety of different forms of assessment, including written exams with open (essay) questions, individual assignments, group assignments and presentations (often in a group).

According to the students, the written exams are well constructed and feasible. However, they indicate that the exam questions of the Summer and Winter Courses are based on only 15 of 80 lectures and do therefore not cover the learning material. The panel was pleased to hear that this has changed since the start of the academic year 2021-2022 and that these exams currently consist of a combination of 40 open and closed questions. After a written exam, a review moment is organised with the examiner to enable students to check their graded exam and ask questions. Students and alumni feel that the possibility to receive feedback or to discuss the results is sometimes too limited.

During the courses, students conduct mainly group assignments. To ensure that all individuals participate actively in group assignments, the programme uses small groups of 2-4 students, and sets up the assignments is such a way that they require discussion about the course materials. Both students and staff reported that the assessment of the groupwork is fair.

The main components of the programme are the two research internships. The research proposals for both internships are important elements and assessed by the supervisor and co-reviewer. Attending the presentations of the research proposals is compulsory for all other students, and most of the core

teachers attend them as well. They use the received feedback to adjust their proposal and hand in their final version. The supervisor assesses whether feedback was processed adequately and whether the proposal is sufficient to continue.

The panel appreciates the use of rubrics to evaluate the student's performance during the internships. These rubrics assess the following elements: 1) personal skills and attitude; 2) independence and decisiveness; 3) communication skills; 4) organisational talents; 5) knowledge and insight; 6) accuracy and the quality of the work, and 7) the quantity of the work. At the end of each internship, the student's supervisor together with an independent co-reviewer from another department score these seven elements. These elements are also assessed during the Mid Term Review (MTR) halfway through the research project. Students have this MTR of their performance in the lab with their supervisor, co-reviewer and a representative of the programme management. The panel noted that students and alumni are positive about their MTR. Students also indicated that they could give feedback to their supervisor during this MTR.

In the second research project, students prove whether they are able to use the knowledge and skills they have gained over the course of the programme to conduct their own research, culminating in a master's thesis. The master's thesis is an original research report that follows the same structure as a scientific publication. It is the final work of the I&I programme and therefore used to assess the student's ability to accomplish the entire research cycle.

The panel is positive about the extensive process to safeguard the quality of the thesis. The final graduation process includes four reviews of the final thesis: one by the supervisor, two by co-reviewers from different departments, and one by an external co-reviewer. The second and the external co-reviewers were not involved in the student's research project and assess the research paper without having seen the assessment of the other assessors. All assessors have at least a PhD degree and three of them work within Erasmus MC. Experience shows that those four reviews do not differ too much.

After submission of the thesis, the supervisor and all co-reviewers provide a short-written opinion on the student's report, describing the strong and weak points and suggestions for improvement. Based on these reviews, the student has to write an unsupervised rebuttal in response to all of them. The rebuttal often results in a revision of the thesis and shows that the student can defend, judge and value his/her own research. The rebuttal is also assessed, but only by the supervisor. At the end, the final mark for the last internship for graduation is given by weighted factors: 40% for the lab (practical) abilities, 40% for the thesis including the comments given in the Rebuttal, and 20% for the presentation. This final mark for the presentation is given by the Programme Director, in agreement with the supervisor who also assessed the rebuttal, and the core teachers who attended the presentation.

The panel noted that the narrative feedback on the theses as provided by supervisors and reviewers is extensive. It also highly appreciates the use of the rebuttal. In its opinion, it is an intensive procedure, but it certainly has added value.

The panel encourages to programme to continue improving the assessment process of the thesis, e.g. by organising 'calibration sessions' for examiners, and developing a clear vision on the relation between the formative and summative assessments.

Examination Board

The Examination Board (EB) is responsible for the examination and assessment quality of all bachelor's and master's programmes at Erasmus MC. In 2018, the Research Master Examination Board joined forces with the EB of the bachelor's and master's programme Medicine and has become the Chamber Research Masters of the EB Erasmus MC (CRMEB). The CRMEB operates as an independent body and safeguards the quality and level of the assessments, assessment system and achievement of learning outcomes, determines whether students meet the requirements set out in the Teaching and Examination Regulations (TER), and sets the rules and guidelines that are supplementary to the TER for the five research master's and the postgraduate master's programme.

The assessment committee is a joint effort by the EB and the programme management. This committee functions as a meeting place for the programme management and the EB, where members can discuss any topic concerning assessment they want. The topics discussed are more on a general level than in the assessment carrousel that is introduced in 2018 to support the EB in adequately assuring the quality of examinations. Further assistance was provided in 2019 by a two-year intensive EUR-wide project on assuring the quality of assessment, with financial support from the Executive Board and the Dean.

The I&I assessment carrousel consists of two examiners of the programme, the Programme Coordinator, one educational assessment expert, one member of the core team and two members of the EB. Four times per year two or three examiners are invited to evaluate their assessment(s) and the assessment process in a cooperative and constructive manner. The assessment carousel assesses the quality and the format of the exams, monitors the exam procedure and, if necessary, advises the Programme Board and reports to the EB. The panel was pleased to hear that the assessment carousel recently evaluated the master's thesis of three recently graduated I&I students. In 2021, the initial joint responsibility was replaced by a clearer role division in which the programme is in the lead of the assessment carousel and the EB observes and participates.

The panel is confident that the CRMEB is well equipped and positioned to safeguard the quality of the assessments, but adequate support and facilitation of the CRMEB by the organisation remains very important. The panel encourages the programme management to prioritise the assessment carrousel to ensure and improve the quality of the assessment.

Conclusion

The panel concludes that I&I has an adequate assessment system. The programme therefore meets standard 3.

2.4 Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

The panel reviewed fifteen master's theses of the programme. The panel is positive about the high quality of the theses. The theses have a clear academic style, a proper methodical section, and a critical discussion of results. All theses the panel studied demonstrate that students have the ability to conduct research at a research master's level. Sometimes the panel would have given a slightly higher or slightly lower grade, but never deviating by more than one point. The panel determined that all students accomplished the entire research cycle during the second research internship. According to the panel the writing of a rebuttal certainly has added value.

During the site visit, the alumni reported that they feel well-prepared for their current PhD position. Out of the 88 graduates in the last six years, 58 (66%) obtained a PhD position. Part of the graduates who do not continue into a PhD programme, continue their career as medical doctor and another part finds a job in industry. The panel noticed that the percentage of graduates that obtained a PhD has dropped significantly in recent years. Of the alumni who graduated in 2017 63% have a PhD position, compared to only 24% of the alumni who graduated in 2018. The panel realises that these percentages of the latest cohorts may still increase. These numbers also indicate that it is of great importance to give students more support to take an informed decision about their future career. Moreover, not all students that pursue a PhD position will continue in academia upon receiving their doctorate. Students at this stage of their career are often not aware of the fact that only a limited fraction will remain in academia. Therefore, the panel was pleased to note that the programme also pays attention to career paths outside academia. It encourages the programme to strongly and proactively advise students to take the available course on 'Career development' or to visit career markets. The panel feels this is very important to allow students to make an educated and motivated decision about their future career.

The panel also advises the programme to strengthen the ties with alumni e.g. through social media, by organising career talks with alumni or inviting them as guest lecturers.

Conclusion

The panel concludes that I&I students achieve an adequate final level and find suitable jobs. The programme therefore meets standard 4.

3. Strengths and recommendations

3.1 Strengths of the programme

The panel is impressed by the following features:

- Well- balanced curriculum – The curriculum provides a good balance between theoretical courses, skills courses, and intensive hands-on training in research.
- Research orientation – The research orientation of the curriculum is beyond dispute. The curriculum includes two research projects, allowing students to engage actively in different research groups.
- Teaching team – The teaching staff is motivated, well-qualified and knowledgeable in their respective areas. They are active researchers and able to bring in the latest developments in their field.
- Master's thesis – The programme has a thoughtful and extensive procedure to safeguard the quality of the master's thesis, including the rebuttal students write. The theses reflect the high scientific standards of the research master's programme.

3.2 Recommendations

For further improvement of the programme, the panel makes the following recommendations:

- Intended learning outcomes – Reformulate and update the learning outcomes by integrating the attention the programme pays to the development of transferable skills. Ensure that the ILOs are distributed in a well-balanced way throughout the different courses of the programme.
- Statistics and bioinformatics – Integrate statistics and bioinformatics in a more structured way into the curriculum: a) make the current elective course on bioinformatics compulsory for all students, and b) replace the compulsory course SPSS by a compulsory course on R and integrate this with a broader course on statistics. Assign these courses with sufficient EC.
- Selection procedure – Make the selection procedure more transparent and communicate beforehand clearly on which criteria students are ranked and selected.
- Internships – Protect students from any pressure to extend their internship by setting a fixed deadline. Create a timetable that specifies the time the student will spend on the internship and must be approved by the supervisor and the programme management. The number of EC should match with the actual time spent on the internship.
- Didactical concept – Further elaborate, explicate and implement the didactic concept aimed at activating interactive education that pays attention to the personal and professional development of students.
- Career paths – Pay specific attention to career paths outside academia to allow students to make an educated and motivated decision about their future career.

4. Conclusion

The panel has found that the intended learning outcomes (standard 1), the teaching-learning environment (standard 2), the assessment system (standard 3) and the achieved learning outcomes (standard 4) meet the criteria.

The intended learning outcomes reflect the programme's aims and vision and are in line with the discipline's and international requirements. The curriculum, the teaching methods, the quality of the teaching staff and the assessment system enable the incoming students to achieve the intended learning outcomes.

Standard	Judgement
Standard 1	Meets the standard
Standard 2	Meets the standard
Standard 3	Meets the standard
Standard 4	Meets the standard
Final conclusion	**Positive**

Appendix A – Panel composition and programmes of the cluster

The cluster consists of six research master's programmes:

66586	M Cardiovascular Research (research)	Vrije Universiteit Amsterdam
60312	M Clinical Research (research)	Erasmus University Rotterdam
60120	M Health Sciences (research)	Erasmus University Rotterdam
60375	M Infection and Immunity (research)	Erasmus University Rotterdam
60322	M Molecular Mechanisms of Disease (research)	Radboud University Nijmegen
60279	M Molecular Medicine (research)	Erasmus University Rotterdam

Panel composition of the cluster

Core panel

- Prof. dr. F.C.S. (Frans) Ramaekers, professor emeritus Molecular Cell Biology, Maastricht University;
- Prof. dr. M. (Marieke) van der Schaaf, professor of Research and Development of Health Professions Education, University Medical Center Utrecht;
- Dr. J. (Jolanda) van der Zee, associate professor in Education of Biomedical Science and Medicine, Leiden University.

Health Cluster

- Prof. dr. M.B. (Monique) Breteler, Director of Population Health Sciences, German Center for Neurodegenerative Diseases (DZNE), professor of Population Health Sciences, University of Bonn, Germany;
- L.M. (Lotte) Klein BSc, student M Clinical and Psychosocial Epidemiology (research), University of Groningen.

Molecular Cluster

- Prof. dr. J. (John) Creemers, professor of Biomedical Science, KU Leuven;
- V.E.J.M. (Victoria) Palasantzas MSc, student M Molecular Medicine and Innovative Treatment (research), University of Groningen (graduated in 2021).

Appendix B – Schedule of the visit

Programme site visit research masters Infection & Immunity and Molecular Medicine

25 November

Time	Session
8:30 -10.00	Panel preparation Infection & Immunity
10.00 -10.45	Programme Management Infection & Immunity
11.00 -12.00	Students and Alumni Infection & Immunity
12.00- 12.30	Open Consultation hour (I&I and MScMM combined)
12.30 -13.15	Lunch
13.15 -14.00	Lecturers Infection & Immunity
14.00 -15.00	Evaluation and preparing questions for second management meeting Infection & Immunity
15.00 -16.00	Student presentations of current lab work
16.00 -17.30	Panel preparation Molecular Medicine

26 November

Time	Session
9.00 - 9.45	Programme Management Molecular Medicine
10.00 -11.00	Students and Alumni Molecular Medicine
11.15- 12.00	Lecturers Molecular Medicine
12.00 -12.45	Lunch
12.45 -13.30	Examination Board Infection & Immunity and Molecular Medicine
13.30 -14.15	Evaluation and preparing questions for management Molecular Medicine
14.15 -14.45	Second management meeting Infection & Immunity
14.45 -15.15	Second management meeting Molecular Medicine
15.15 - 17.00	Panel evaluation of preliminary findings (panel only)
17.00 -17.30	Presentation preliminary panel findings (in English)

Appendix C – Documents studied

- Critical reflection with appendices
    - Appendix 1 – Departments participating in the programme
    - Appendix 2 – Intended learning outcomes
    - Appendix 3 – Success rate and teacher education
    - Appendix 4 – Recommendations of the previous assessment
    - Appendix 5 – Overview of appendices that are digitally available
- Fifteen theses with assessment forms
- Teaching and Examination Regulations Research Masters 2021-2022
- Teaching and Examination Regulations Research Masters 2021-2022 Appendices
- Rules and Regulations of the Examination Board
- Annual report Examination Board Erasmus MC 2019-2020
- Assessment Policy and Assessment Plan MSc Infection and Immunity
- Overview Teachers / Teacher Qualifications
- Educational Vision Erasmus MC Research Masters
- Anonymised list of theses of the last years (August 2017 - March 2021)
- SEP report Diagnostics & Advice
- The Research Bible: an overview of research projects offered
- Previous panel assessment report and NVAO decision (2015)

- Documentation available on the digital learning platform (DLP):
    - Golden Rules
    - Description of the organisation of the Journal Clubs
    - Description of the organisation of the graduation

Appendix D – Abbreviations

CRMEB	Chamber Research Master Examination Board
EB	Examination Board
EC	European Credit
Erasmus MC	Erasmus Medical Centre
I&I	Infection and Immunity
ILO	Intended learning outcome
JC	Journal Club
MolMed	Molecular Medicine
MScMM	Master Molecular Medicine
MTR	Mid Term Review
NVAO	*Nederlands-Vlaamse Accreditatieorganisatie*
PhD	Philosophiae Doctor
SEP	Standard Evaluation Protocol
TER	Teaching and Examination Regulations
UTQ	University Teaching Qualification
SUTQ	Senior University Teaching Qualification