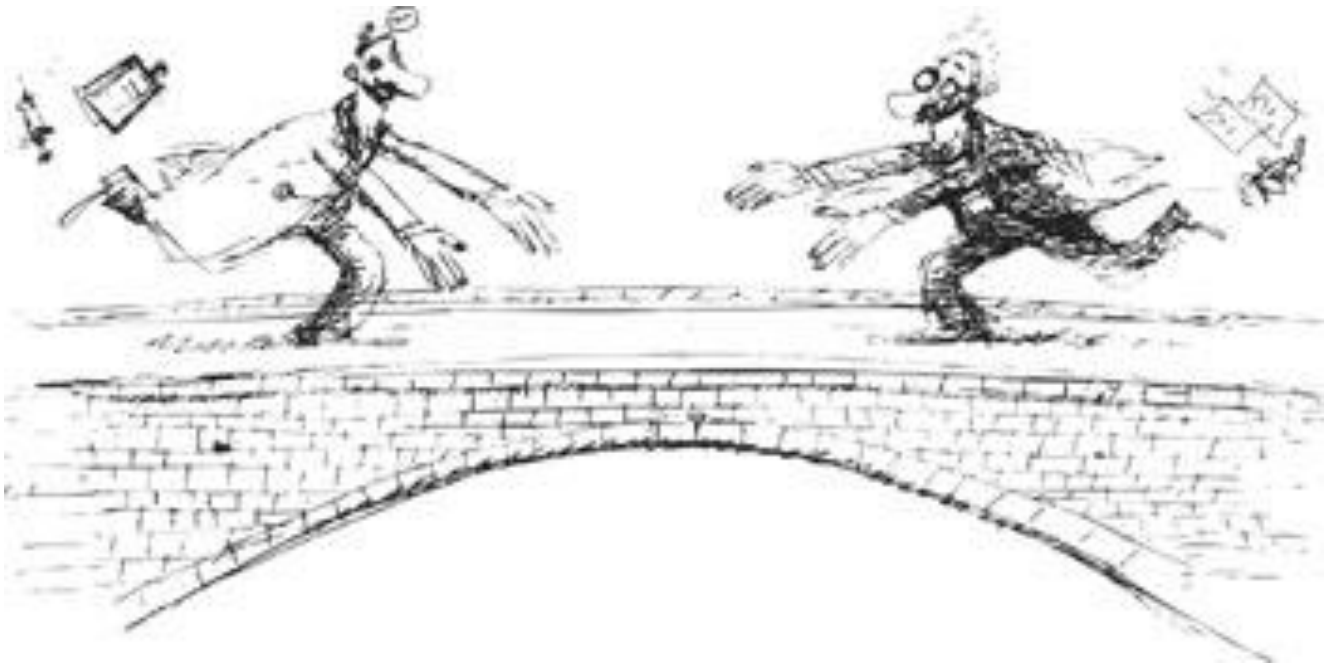


Erasmus MC

Universitair Medisch Centrum Rotterdam



**Research Master
'Infection & Immunity'**

EMIR: Erasmus Master for 'Infection & Immunity' Research

Revised version KNAW/NVAO 23122008

Natural Science

*“When the ebbing tide retreats
Along the rocky shoreline
It leaves a trail of tidal pools
In a short-lived galaxy
Each microcosmic planet
A complete society
A simple kind of mirror
To reflect upon our own
All the busy little creatures
Chasing out their destinies
Living in their pools
They soon forget about the sea . . .”*

Neil Peart

**Request for accreditation of the two-year research Master's programme
'Infection & Immunity'**

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PART A:

Details

A. Characteristics of the Institution

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Prof. dr. S.W.J. Lamberts, rector magnificus

Drs. C.W. van Rooijen, vice-president

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B. Basic characteristics of the new curriculum

The research master programme “Infection & Immunity” awards a Master of Science degree.

C. Project leaders

Prof. Ab Osterhaus, DVM PhD,

- . Department of Virology
- . Chairman Steering Committee, Scientific Director
- . Scientific Director Erasmus Postgraduate Research School Molecular Medicine

Prof. Alex van Belkum, PhD PhD,

- . Department of Medical Microbiology & Infectious Diseases
- . Vice-Chairman Steering Committee

Dr. Jan Nouwen, MD PhD

- . Department of Medical Microbiology & Infectious Diseases
- . Department of Internal Medicine, section Infectious Diseases
- . Chairman Programme Committee, Programme Director

Prof. Jon Laman, PhD

- . Department of Immunology
- . Vice-Chairman Programme Committee

Dr. Frank van Vliet, PhD

- . Managing Director
- . Managing Director Erasmus Postgraduate Research School Molecular Medicine

Steering Committee	Prof. Alex van Belkum, PhD PhD	Medical Microbiology & Infectious Diseases
	Prof. Rob Benner, PhD	Immunology
	Prof. Charles Boucher, MD PhD	Virology
	Prof. Jan Cornelissen, MD PhD	Hematology
	Prof. Jacques van Dongen, PhD	Immunology
	Prof. Ronald de Groot, MD PhD	Pediatrics UMC Radboud Nijmegen
	Dr. Nico Hartwig, MD PhD	Pediatrics, division Infection & Immune Diseases
	Prof. Mieke Hazes, MD PhD	Rheumatology
	Prof. Harry Janssen, MD PhD	Hepatology
	Prof. Marion Koopmans, DVM PhD	Virology, RIVM Bilthoven
	Prof. Ernst Kuipers, MD PhD	Gastroenterology
	Prof. Bart Lambrecht, MD PhD	Pulmonology, Erasmus MC and University Hospital Gent, Belgium
	Prof. Martino Neumann, MD PhD	Dermatology
	Dr. Edward Nieuwenhuis, MD PhD	Pediatrics, division Gastroenterology
	Prof. Ab Osterhaus, DVM PhD	Virology (<i>chairman</i>)
	Prof. Sillevius Smitt, MD PhD	Neurology
	Prof. Kris Thielemans, MD PhD	Physiology and Immunology, Medical School Free University Brussels, Belgium
	Prof. Henri Verbrugh, MD PhD	Medical Microbiology & Infectious Diseases
	Prof. Willem Weimar, MD PhD	Internal Medicine, section Transplantation Medicine

Programme committee Carla Baan, PhD
Irma Bakker, PhD
Tom Cupedo, PhD
Prof. Pieter van Doorn, MD PhD
Hubert Endtz, MD PhD

Prof. Ron Fouchier, PhD
Teun van Gelder, MD PhD
Wil Goessens, PhD
Martin van Hagen, MD PhD

John Hays, PhD
Jaap van Hellemond, PhD
Rudi Hendriks, PhD
Peter Hermans, PhD
Rogier Hintzen, MD PhD
Bart Jacobs, MD PhD
Dick Kok, PhD
Prof. Thijs Kuiken, DVM PhD
Jaap Kwekkeboom, PhD
Prof. Jon Laman, PhD
Erik Lubberts, PhD
Jan Nouwen, MD PhD

Prof. Errol Prens, MD PhD
Guus Rimmelzwaan, PhD
Janneke Samsom, PhD
Cees Vink, PhD
Greet Vos, MD PhD
Andrea Woltman, PhD

Internal Medicine
Medical Microbiology & Infectious Diseases
Hematology
Neurology
Medical Microbiology & Infectious Diseases Erasmus MC
and International Centre for Diarrhoeal Disease Research,
Bangladesh
Virology
Hospital Pharmacy and Internal Medicine
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Immunology and Internal Medicine,
section Clinical Immunology
Medical Microbiology & Infectious Diseases
Medical Microbiology & Infectious Diseases
Pulmonology
Pediatrics UMC Radboud Nijmegen
Neurology
Neurology
Urology
Virology
Hepatology
Immunology
Rheumatology
Medical Microbiology & Infectious Diseases and
Internal Medicine, section Infectious Diseases
Dermatology and Immunology
Virology
Pediatrics, division Gastroenterology
Pediatrics, division Infection & Immune Diseases
Medical Microbiology & Infectious Diseases
Hepatology

D. Didactic support

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PART B:

Basic programme characteristics,

Introduction,

Mission statement,

General aim of the programme

**Why a new Research Master programme Infection and
Immunity at Erasmus MC?**

Basic characteristics of the programme	
Orientation	University (WO), research master
Duration	120 ECTS
Degree	Master of Science in Infection & Immunology
Variants	Full-time (2 years)
Location	Erasmus University Rotterdam Erasmus Medical Center, Rotterdam, The Netherlands
Accreditation	First request
Intake students master programme Infection & Immunity	First intake 2009/2010

Introduction

“THEM and US no longer: scientists and medical doctors view research through different lenses – but the gulf in outlook between the two tribes isn’t what it used to be.”
(Meredith Wadman. Nature 2006;439:779-780)

Erasmus University Rotterdam and Erasmus MC, University Medical Center Rotterdam, plan to offer an international Research Master programme ‘Infection & Immunity’. This two-year programme aims to train students in translational research at the crossroads of infection and immunity by top-quality research groups at Erasmus MC.

The main aim of the research master programme is to train excellent students to become esteemed researchers capable of ‘translating’ basic science into clinical medicine and vice versa. The master programme will combine intensive training in fundamental and advanced immunology and microbiology with extensive training in clinical and population-based research. One important competency required will be the ability to effectively collaborate within and outside the research group. After two years, the Research Master programme ‘Infection & Immunity’ will result in a master thesis, to be presented at the yearly Research Master ‘Infection & Immunity’ symposium.

Mission, Vision & Motto

"We are now experiencing an unprecedented blossoming in available technologies, unparalleled through history, which makes biomedical science extraordinarily exciting. An increasing focus on the need for effective translation from the use of these resources highlights the many obstacles that impede progress."

(Sabroe et al. Nature Reviews Immunology 2001;7:77-82)

MISSION

It is our mission to select and train excellent students at an early stage of their career to perform top research in the field of Infection & Immune Diseases covering the complete field of host-microbe interplay and autoimmunity, challenge them to become translational investigators, foster them and commit them to the academic world.

VISION

Recent developments in (bio)medical technologies provide novel tools to gain in-depth knowledge of the fundamental mechanisms of infectious and immune diseases. The goal of the Research Master 'Infection & Immunity' programme is to train excellent and motivated students integrating basic and clinical biomedical sciences in the field of Infection & Immune Diseases. Research themes will mainly focus on host-microbe interplay with an international outlook and build on the excellent track record of the research groups concerned.

Translational research is the hallmark of Erasmus MC. Its quality relies on strong communication between clinicians and basic scientists. With this research master programme Erasmus MC will invest in a new generation of translational scientists that will strengthen and improve Erasmus MC research.

MOTTO

Communicable Excellence in Translational Infectious & Immune Disease Research.

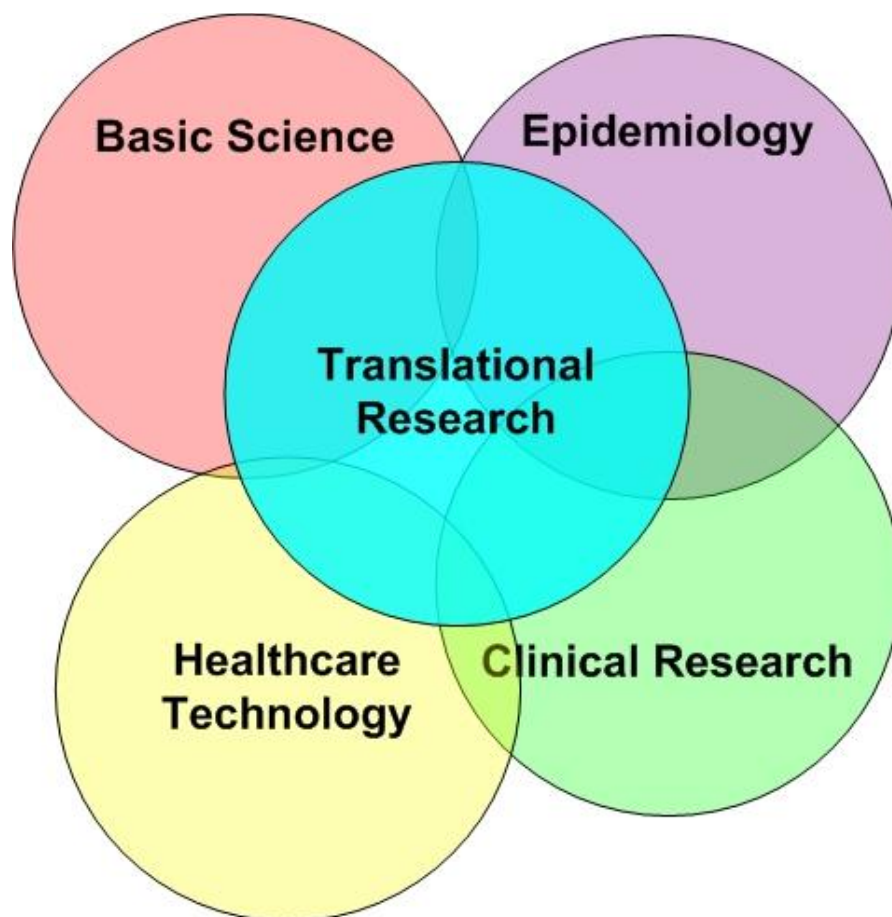
General aim of the programme

“It is not the priority of scientists to engage with clinicians: the imperative is equally strong that clinicians should engage more with basic scientists”

(Sabroe et al. Nature Reviews Immunology 2001;7:77-82)

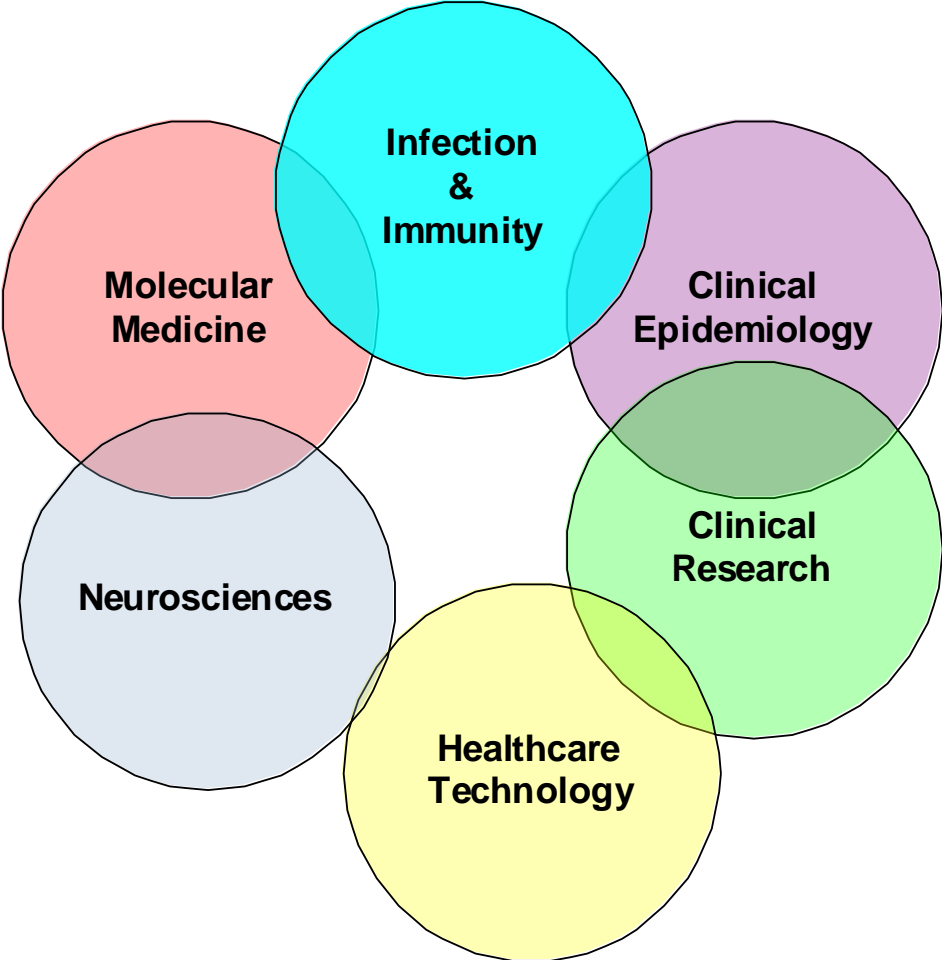
Several research fields can be discerned in biomedical research, with translational research being the field of research aiming to bridge the divide between basic science and clinical medicine (figure 1).

Figure 1: various types of research



At Erasmus MC several research masters exist already ore are planned to start shortly, all with their own special focus, and in part overlapping (figure 2)

Figure 2: the different research master of science programmes at Erasmus MC



Why a new Research Master programme 'Infection & Immunity' at Erasmus MC?

The current research master programmes Molecular Medicine, Neurosciences, Clinical Epidemiology and Clinical Research each cover (partly overlapping) specific aspects of the spectrum of biomedical research at Erasmus MC. All these programmes have been developed by the excellent research groups and departments involved. However, **an accredited** research master programme specifically covering the complete and broad spectrum of basic, clinical and translational research in infectious and immune diseases as present at Erasmus MC, had not been developed so far at Erasmus MC and elsewhere in the Netherlands. We feel that due to the impact of infectious and immune diseases locally and globally and due to the excellent status of the various infectious and immune disease research groups at Erasmus MC, such a research master programme is urgently needed. It would connect beautifully with the 2nd year course 'Infectious & Immune Diseases' within the regular medical curriculum at Erasmus MC.

Unique selling points of a research master programme 'Infection & Immunity' at Erasmus MC are:

- High-quality biological research within the complete field of high-quality academic medical research.
- The excellent research status of the departments involved (as described in part C, paragraph 2.1 'Academic orientation', page 15).
- The tight interaction between and integration of basic science and clinical research in excellent translational research programmes.

Furthermore, the research master will be incorporated within the research and education framework of Erasmus MC with unique selling points, including:

- The embedding of the programme within the Erasmus Postgraduate Research School Molecular Medicine.
- The cooperation between and integration of the various research master programmes at Erasmus MC.
- The integrated multidisciplinary research groups.
- A backbone of compulsory summer and winter courses (confection), supplemented with individualised (tailor-made) education.
- The excellent facilities for (pharmaco)genomics, biomics, proteomics and in vivo and animal imaging.
- The presence of BSL3+ facilities and connected reference laboratories.
- The vast experience with animal models.
- The availability of several large patient cohorts with extensive clinical and genetic characterisation.
- The broad spectrum of and vast experience with bone marrow and solid organ transplantation programmes and facilities, including pharmaco-epidemiology and –immunology.
- The proposed research master programme fits also very well in the philosophy of the Board (Raad van Bestuur) of Erasmus MC as outlined in the strategic document '2004-2007: Topkwaliteit (Klinisch) Onderzoek'.

PART C:

Discipline-specific reference framework

1 Aims and objectives of the programme

1.1 *Discipline specific requirements*

The master programme in Infection & Immunity aims at training researchers who are well educated in research methodology and who will be able to pursue a scientific career. Therefore the programme enables the student to become an independent researcher, who can subsequently complete a PhD programme, either as part of his/her training as a medical specialist, or as part of a career track in biology, biomedical sciences, biochemistry or veterinary medicine. Senior researchers and lecturers with a leading international reputation in their field and who are competent to do research at a master's level and beyond are invited to teach and assess students according to the Dublin descriptors.

1.2 *Master level*

As far as we have been able to establish, this integrated programme will have a high standard, compared on a national as well as an international level. The intended learning outcomes meet the criteria of a master's degree and reflect recent developments as well as requirements from the professional practice by choosing senior researchers and lecturers with a leading international reputation in their field and having the abilities to do research at master's level and beyond. The participation of leading scientists and lecturers guarantees that students who have obtained a master's degree in Infection & Immunity are qualified to do research at the academic level.

The programme provides candidates with a solid theoretical, methodological and statistical basis for designing and implementing a research project and teaches them how to best publish the results of their research project.

Therefore the students should fulfil all Dublin descriptors. Applied to this research master curriculum the following qualifications are met:

Knowledge and understanding:

- The student has acquired adequate basic knowledge about infection and immunity at the level as specified by the S.M.B.W.O. (Stichting Medisch Biologisch Wetenschappelijk Onderzoeker): see description on www.smbwo.nl.
- The student shows originality in developing or applying ideas in a research context.
- The student is able to formulate a basic and/or clinical problem and translate it into a scientific question.

Applying knowledge and understanding:

- The student is able to solve problems in new or unfamiliar environments within a multidisciplinary context.
- The student has to perform an extensive study of the literature concerning the research subject.
- The student has acquired sufficient knowledge of existing methods of basic and clinical scientific research, biomedical laboratory skills, biostatistical analytical methods, laws, regulations and ethics and is able to use such knowledge in a research protocol.

Making judgements:

- The student is able to integrate knowledge and handle complexity, and to formulate judgements with incomplete data.
- The student must be able to translate a (complex) scientific question into a research protocol.
- The student is able to perform research, collect and analyse data and draw conclusions.

Communication:

- The student is able to communicate his conclusions and the underpinning knowledge and rationale to specialist and non-specialist audiences in a monologue.
- The student is able to write a master's thesis including a description of the objective(s) of the investigation, a summary of the literature, materials used, methods applied, results obtained, discussion and the conclusion of the research and to present these data at the Research Master symposium.
- The student is able to write a PhD research proposal based on the data gathered and conclusions from his research master project.
- The student is able to write an article, which qualifies to be published in an international peer-reviewed journal.
- The student is able to integrate and collaborate with others within and outside his multidisciplinary research group.

Learning skills:

- The student is able to study largely self-directed and autonomous.

1.3 Academic orientation

The master in Infection & Immunity lasts two years (120 ECTS). The competencies to be acquired comply with what is required to become an independent scientist in the research field of Infection & Immunity. Therefore, besides all the skills needed to be an excellent researcher, the programme has a special focus on the tight interaction of basic science and clinical research in translational research programmes. To graduate, the students have to write a master's thesis, preferably in the format of a scientific article qualifying to be published in an international peer-reviewed journal, as well as a PhD research proposal based on the data gathered and conclusions from their research master project. These requirements ensure that the students are trained to carry out research that is relevant to recent developments in the field of Infection and Immunity. The master programme in Infection & Immunity combines theoretical training and practical research training to prepare participants for research (e.g. a PhD project), executive and advisory positions in the fields of microbiology, infectious diseases, immunology and molecular biology. The master programme thus provides an excellent starting position to undertake a PhD research project.

2 Curriculum

2.1 Academic orientation

The high academic standard of the programme is assured by the fact that the research departments selected are all known for their high scientific standards. In the Discipline Report on (Bio) Medical and Health Sciences Research in the Netherlands of the Royal Netherlands Academy of Arts and Sciences (1998) the scores of the research groups, participating in the 'Infection & Immunity' research master programme were as follows:

Immunology:	excellent
Hematology:	excellent
Virology:	excellent
Medical Microbiology & Infectious Diseases:	good
Pediatrics:	good

Since 1998 no new evaluation by the Royal Netherlands Academy of Arts and Sciences has been performed. Hence no scores are available for 'new' departments like the department of Gastroenterology and Hepatology.

However, all academic institutes have been analysed recently on their research output and impact using trend analyses in the period 1997-2005. The main indicator used in these analyses is the citation score Crown indicator (CPP/FCSm). All participating departments have Crown indicator scores significantly above the world average of 1.0. For all departments the high Crown indicators have been maintained throughout the whole period of 1997-2005, with a clear rise for several in the last period evaluated (2002-2005).

The Crown indicator scores of the research groups, participating in the Research Master 'Infection & Immunity' were as follows:

	<u>1997-2005</u>	<u>2002-2005</u>
Gastroenterology & Hepatology:	1.26	1.22
Hematology:	1.39	1.61
Immunology:	1.36	1.75
Internal Medicine:	1.60	1.48
Medical Microbiology & Inf. Diseases:	1.46	1.71
Neurology:	2.25	2.11
Pediatrics:	1.31	1.43
Pulmonology:	1.20	1.32
Urology:	1.22	1.32
Virology:	1.97	3.03

The postgraduate School of Molecular Medicine has been evaluated by an international committee in 2003. The document "Application for Renewal of the Erasmus Postgraduate school Molecular Medicine October-December 2003" provides a recent and comprehensive overview of its research and educational activities (see appendix 2 for a current overview). The report and recommendations of this committee can be found in Annex 5-10 (pages 331-344). Relevant to the Research Master 'Infection & Immunity' is that this document gives an up-to-date insight into the different research lines and their international standing in which a Research Master research project can be conducted. In addition, it provides insight into the postgraduate educational activities of the participating departments, which underscores the commitment of the participating departments to organise and provide education in basic, clinical and translational research, also at the postgraduate level.

In the trend analysis of citations of the postgraduate School of Molecular Medicine the Crown indicator (CPP/FCSm) was 1.55 in the period 1997 – 2005 and 1.67 in the last three-year period evaluated (2002-2005).

2.1.1 Interaction education and research

The Master in Infection & Immunity combines theoretical training and practical research training (see appendix 1 for a detailed description of the curriculum). In two years, students will be trained in translational research at the crossroads of infection and immunity by top-quality research groups at Erasmus MC. Intensive training in fundamental and advanced immunology and microbiology will be combined with thorough training in clinical and population-based research. The programme covers the complete field of host-microbe interplay and autoimmunity: e.g. immunology (fundamental, organ-specific), transplant immunology, auto-immune diseases, immunodeficiencies, virology and microbiology (basic and advanced), the role of genetic variation in host and microbe, clinical pharmacology, epidemiology of infectious diseases and biosafety.

During the programme, individualised training will consist mainly of 'learning by doing' in the future work surroundings. Apart from the compulsory courses, students make an individual choice from courses adapted or specifically needed for the research subject chosen. Erasmus MC has a broad range of courses available from the various research master programmes (Molecular Medicine, Neurosciences, Clinical Epidemiology and Clinical Research, (see figure 2) and research schools (COEUR, Molecular Medicine, Neurosciences and NIHES). If considered essential, courses by international scientific organisations (for instance the European Society of Clinical Microbiology & Infectious Diseases [ESCMID], the European Society for Immunodeficiencies [ESID], European Federation of Immunological Societies [EFIS], EpiEd, TropEd and others will be attended.

2.1.2 research character of the programme

In spite of the advent of vaccines, antibiotics, antivirals and numerous successes in the combat of infectious diseases in the past century it has now become painfully clear that known and newly emerging infectious diseases will be a major challenge for the world at large in the coming decades. Research focuses on interactions between infectious pathogens and the host. This happens with significant collaboration between the 7 working groups (*Viral infections, Molecular pathogenesis and epidemiology of infectious diseases, Pediatric infectious diseases and immunology, Gastro-enterology, Pediatric gastro-enterology, Transplantation immunology and Mucosal immunology*) of the Infection & Immunity theme of the Molecular Medicine postgraduate school, taking advantage of complementary research activities and infrastructure of the other three themes (Endocrinology & aging, Haematopoiesis & lymphopoiesis and solid tumors) of this school.

The research character of the programme is especially apparent from the fact that:

- students are extensively trained in statistics and scientific methodology.
- students are extensively trained in lab skills.
- throughout the programme students participate in journal clubs and research discussions; in the journal clubs, students study recent scientific articles, comment on them and present them to their peers.
- performing research is a very important part of the programme, comprising 70 ECTS.

The master programme in Infection & Immunity is embedded in the Molecular Medicine postgraduate school. The educational programme of the research master follows the focuses and research traditions of the research groups of the Molecular Medicine postgraduate school:

For more details see appendix 1	
Fundamentals	Basic lab skills, immunology, microbiology, virology Overview of available research themes.
	Medical research.
	Academic skills
Organ-specific	Organ-specific immunology, host-microbe interplay, transplant immunology, clinical pharmacology.
	Academic skills
Technology & methodology	Molecular microbiology & immunology, modelling Infectious Diseases, role of genetic variation in host and microbe, immuno-endocrinology, animal models, biosafety.
	Academic skills
Disease specific	Infections & auto-immune diseases, chronic intestinal and liver inflammatory diseases, inflammation and cancer, neuro-immunological diseases, infection & immunodeficiency, vaccines, clinical pharmacology.
	Academic skills.
	Presentation master thesis.

At an international level, the Molecular Medicine postgraduate school offers high standard research and has a very good educational reputation (see paragraph 2.1, the document “Application for Renewal of the Erasmus Postgraduate school Molecular Medicine October-December 2003 and the current overview in appendix 2).

The programme of the research master Infection & Immunity is comparable to the other research master’s programmes of Erasmus MC. Nationally and internationally many master programmes are offered. However, only a minority of these are real research master programmes. Various institutes offer (research) master programmes in infectious diseases and/or immunology. As far as we were able to retrieve, only four institutes offer a research master programme wherein infectious diseases and immunology are integrated (NL, UMC Utrecht & Eijkman Graduate School for Immunology & Infectious Diseases: Immunology & Infection; UK, London School of Hygiene and Tropical Medicine: Immunology of Infectious Diseases; D, ZIBI Graduate School of Berlin: International Max Planck Research School for Infectious Diseases and Immunology and FG Graduiertenkollege: Genetic and Immunologic Determinants of Pathogen- Host-Interactions; USA, Johns Hopkins Bloomberg School of Public Health: Molecular Microbiology & Immunology). On the specific subject of Infection & Immunology and in the specific focus on the tight interaction between and integration of basic science and clinical research in translational research, our programme may currently best be compared with that of the Johns Hopkins Bloomberg School of Public Health (JHSPH). The main differences being that the Molecular Microbiology & Immunology programme of JHSPH is more microbiologically oriented and that students who excel in the first stage MPH programme may apply to continue in the MSc programme.

2.1.3 Requirements for graduation

During the second year of the master programme the student will finish his/her research project.

Theory and practice culminate in the writing of a master thesis. The paper (and the research path to it) will be judged by the coach, two members of either the Steering or Program Committee (from a different department than the coach) and an external expert (national or international) on the following criteria:

- Ability to formulate a relevant problem and translate it into a scientific question.
- Ability to perform an extensive study of the literature concerning a problem.
- Ability to translate a scientific question into a research protocol.
- Acquisition of sufficient knowledge of existing methods of scientific research, biostatistical analytical methods, laws, regulations and ethics and the abilities to use such knowledge in a research protocol.
- Ability to perform research collects data, analyse data and draw conclusions.
- Ability to write a scientific article on the objective(s) of the investigation, summary of the literature, materials, methods, results, discussion and conclusion of his/her research and to submit it to an international peer-reviewed journal.

Other requirements for the thesis are:

- it should be suitable for submission to an international, scientific journal.
- it must be presented at the Research Master symposium successfully.

2.2 Correspondence between the aims and objectives of the curriculum

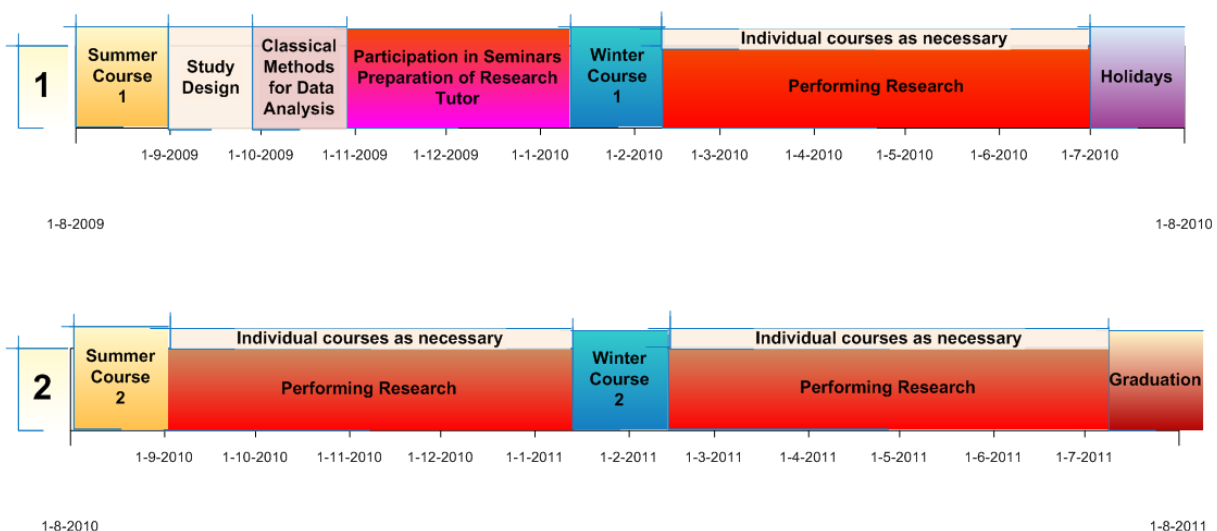
Curriculum

To demonstrate how the curriculum reflects the intended learning outcomes, a short outline of the programme is described below. For each course the contents, objectives, keywords, teaching formats and test format are described in appendix 1.

Short outline of the programme

The Research Master programme consists of two closely integrated parts: education and research. The total programme takes 84 weeks (120 ECTS) over a total period of 2 years. The programme is graphically depicted in figure 3.

figure 3 short overview of the programme.



Fundamental and advanced immunology and microbiology as well as methodology will be taught during two Summer courses (4 weeks each), two Winter courses (4 weeks each), one course Study Design (3 weeks) and one course Classical Methods for Data Analysis (4 weeks) to groups of approximately 15 students. The interactive courses will consist of integrated themes taught by interdisciplinary groups of teachers of the participating research groups. Courses will be theoretical as well as practical. The results will be examined at the end of all these mandatory courses by multiple choice and open/essay questions.

First period (first semester of the first year)

During the 1st summer course (4 weeks) the students get an overview of the available research subjects of the participating research groups. The overview is presented by the leading scientists of the research subjects (see appendix II).

The purpose is to acquaint the students with the participating disciplines and to teach the various aspects of the basic science and clinical relevance of infectious and immune diseases, with an emphasis on translational research, in the global village.

After the 1st Summer course all students have to attend the mandatory courses 'Study Design' (3 weeks) and 'Classical Methods of Data Analysis' (4 weeks). Thereafter, the students will each choose a specific research area and will be assigned a tutor who will serve as a supervisor during the first semester of the Research Master programme. The tutor is a leading scientist or a senior staff member at one of the participating departments and will supervise 3-5 students.

Under the guidance of their tutor, students will have to attend research discussions, seminars, journal clubs and literature readings at the departments of their chosen research area. Furthermore, the students will choose three departments and/or research groups to do their laboratory rotations of two weeks each. They will form 'literature reading classes' (max. 5 students) under supervision of their tutor meeting regularly to discuss relevant articles. In this period, 20 hours a week will be spent on education and training and 20 hours a week on self study and research.

During this period the students are assessed every two weeks by their tutor on presence and participation in research discussions, seminars, journal clubs and literature readings and on the progress of their knowledge of the research area chosen.

Finally, students will have to acquire specific knowledge pertaining to the chosen research subject and will have to write a research proposal (to be presented at the 1st winter course). At the end of the first semester the students are assessed by their tutor, two members of either the Steering or Program Committee (from a different department than the tutor) and an external expert (national or international) on the basis of the presentation and the quality of their research proposal.

Second period (second semester of the first year and the second year)

After they have presented their research proposal successfully at the 1st Winter course, students will enter the research phase of the research master programme (3 periods of 18 weeks with the 2nd Summer and 2nd Winter course in between). Dependent on their research subject, each student will have been assigned a coach who will serve as a supervisor during the remaining periods of the Research Master programme. The coach is the leading scientist or a senior staff member of the research theme chosen.

During the research phase students are obliged to attend the research discussions, seminars, journal clubs and literature readings on their research subject, and continue to participate in the 'literature reading classes'. In the period between the first winter and second summer course, 8 hours a week will be spent on education and training and 32 hours a week on research. In the last two periods, 4 hours a week will be spent on education and training and 36 hours a week on research.

During this period the students are assessed every two weeks by their tutor on presence and participation in research discussions, seminars, journal clubs and literature readings and on the progress of their research.

Furthermore students are obliged to attend courses adapted to or specifically needed for the research subject chosen (with a minimum of 20 ECTS). Erasmus MC has a broad range of courses available from the various research master programmes (Molecular Medicine, Neurosciences, Clinical Epidemiology and Clinical Research) and research schools (COEUR, Molecular Medicine, Neurosciences and NIHES). If considered essential, courses by international scientific organisations (for instance the European Society of Clinical Microbiology & Infectious Diseases [ESCMID], the European Society for Immunodeficiencies [ESID], European Federation of Immunological Societies [EFIS], EpiEd, TropEd and others) will be attended.

In the second semester of the second year students will write a master thesis on the basis of the research project. As a conclusion of the master programme students will present the results of their research project at the Research Master symposium to peers, tutors, coaches, members of the research groups, members of the Steering and Program Committee and external experts (national or international) and others interested. At this symposium the master diploma, if applicable, will be presented together with the award for the best presentation.

Other relevant information

All courses combine lectures with exercises and/or group discussions in order to train the students to formulate research questions, discuss the strengths and limitations of specific research designs as well as the implications of research results, and to critically evaluate the results of research published by other scientists. All students are stimulated to engage in the exercises and discussions actively, which is facilitated by the size of the classes. These courses will be open to students from other research masters as well. Thus, the size of the classes ranges from 5 to 85 students (average 15 students), depending on the specific course.

The skills course Working with SPSS (a computer package for statistical data-analysis) is an integral part of the programme.

For students who need to improve their English proficiency, an English language course is offered. An English course in medical writing will be part of the programme. These are important skills for carrying out data analysis, day to day communication in English and for writing a scientific article in the English language.

Educational concept

The educational concept of the programme is competency-based learning, which implies that the contents and objectives of the courses are directly aimed at one or more of the competencies mentioned in paragraph 1.2. During the research master programme, individualised training will consist mainly of 'learning by doing' in the future work surroundings. The combination of individualised education with theoretical courses ensures that students will acquire the competencies of the master's programme.

To learn to reflect on their competencies students will have to keep record of all courses and meetings they attended, articles they discussed and of other assignments using a portfolio, which will be supervised by their tutors and coaches.

Different didactic concepts are used, namely explaining, demonstrating, questioning, practicing and testing. These concepts are used as guidelines in all courses. An overview of the didactic concepts and the accompanying teaching formats is given in the table below.

Didactic concept	Teaching format
Explaining	Lectures, seminars
Demonstrating	Demonstrations of practical issues, examples of (own) research, (computer) practicals
Questioning	Group discussions, asking questions during lectures
Practicing	(Computer) Exercises, practicals, presentations, reading assignments
Collaborating	Assignments in small groups, research collaboration
Testing	Written exams, presentations, assignments

A variety of educational settings is offered. Students will be encouraged to reach the earlier described competencies in a mix of these educational settings. The table below indicates how the various intended learning outcomes relate to the educational setting.

	Learning on the job	journal clubs seminars & literature clubs	practicals	e-learning	summer & winter course lectures
Develop problem solving abilities in new environments within broader contexts	X			X	X
Perform extensive study of the literature		X		X	
Integrate knowledge and handle complexity	X	X		X	X
Translate a scientific question into a research protocol			X		X
Perform research, collect data, analyse data and draw conclusions	X	X			X
Integrate and collaborate with multidisciplinary research groups	X		X		X
Largely self-directed or autonomous study		X		X	

Assessment programme

The master programme aims to deliver competent junior researchers. The assessment programme suits this aim. Student competencies are assessed individually.

The core courses that cover the vital theoretical basis and the competencies to analyse and interpret the results of a research project are each concluded with a written exam that the students must pass to continue the programme. These exams consist of multiple choice and essay questions on (the analysis of) published research papers. In other first semester courses students are asked to write an assignment or give a presentation (e.g. on a self developed research design). The exams reflect the competencies the student must gain. To ensure that all assessors use the same standards, general scoring instructions must be followed and analyses of the results will be made. Knowledge and understanding are assessed in written exams.

For each competency, the test format, which is best suited will be used. The table below indicates how various competencies will be assessed. More detailed information can be found in appendix 1

	written exam	oral test	draft proposal	presentation	self and peer assessment	master thesis
Develop problem solving abilities in new environments within broader contexts	X		X		X	
Perform extensive study of the literature	X		X	X	X	X
Integrate knowledge and handle complexity			X	X	X	X
Translate a scientific question into a research protocol	X	X				X
Perform research, collect data, analyse data and draw conclusions		X	X			X
Integrate and collaborate with multidisciplinary research groups				X	X	X
Largely self-directed or autonomous study						X

The final assessment is based on course attendance (at least 80% during electives), the examination grades (amounting in total to 50% of the assessment) and on the quality of the scientific paper (the remaining 50%). The Examination Board evaluates all results. Final responsibility with respect to granting any degree is borne by the Examination Board.

International study environment

Erasmus MC has declared 'internationalisation' to be an essential part of its medical curriculum, research master and doctoral programmes. The aim is that by 2010 at least fifty percent of medical students follow part of their training abroad.

All participating research groups and departments closely collaborate with foreign research institutions of a high international standard (see also appendix 3).

Excellent international students will be invited to enter the 'Infection & Immunity' research master programme, integrating education and research and stimulating further collaboration between Erasmus MC and the host institute. As part of the programme, each student will visit one of these foreign institutions, either to participate in translational research or to participate in an international symposium organised by the foreign institution. Funding will be made available to meet the students' travel and accommodation needs.

The programme will also be open to other foreign students who wish to participate and who qualify after the entry procedure (see paragraph 2.5).

All courses will be taught in English.

2.2.2 Attainment target and educational goals

The master programme in Infection & Immunity is embedded in the Molecular Medicine postgraduate school, which offers a national and international scientific environment, regarding both research and education. In coherence with the motto of this master, the "Communicable Excellence in Translational Infectious & Immune Disease Research", masters in this field must not only specialise in their own subject but must also be able to communicate with other researchers in the field.

To ensure that students reach this goal for all offered courses keywords have been identified on which students must be able to apply the competencies named for the Dublin descriptors 'knowledge and understanding' and 'applying knowledge and understanding'. On an individual base students must reach all competencies from the education offered. The 'training on the job' and the education offered by the supervisor offer the students the opportunities to reach this goal.

2.3 Coherence of the curriculum

A detailed description of the curriculum can be found in appendix 1. A short outline is presented in paragraph 2.2.1.

As both the appendix and the outline show, course wise education can be found in the first as well as the second year: students follow the mandatory Summer course twice and a Winter course twice: the first Summer and Winter course being programmed in the first year and the second ones in the second year. After the first Summer course, students will have two mandatory courses in methodology: Study Design and Classical Methods for Data Analysis.

The courses, as well as other educational activities such as the reading class groups, prepare the students for the research. In the courses students acquire knowledge of scientific methodology and of lab skills. The theoretical knowledge of the research subject chosen is also taught course wise. We conclude that the courses and the research project are closely intertwined and that one cannot exist without the other.

2.4 Student Workload

The modular format of the master in Infection & Immunity and the long research period enables a clear structure of the programme, i.e. a course is completed before commencement of a new research period, which facilitates the learning process of the participants. During the courses students have enough time to study prior lectures, do homework and prepare coming lectures. In addition, almost all exams are preceded by a two to seven days study period for optimal preparation of the exams. However, whether there are certain impediments to study progress can be established best when the programme is running. Therefore, in the oral evaluations special attention will be paid to this issue. If need be, changes in the programme will be made.

2.5 Admission requirements

Two main target groups will be eligible to enrol in the programme.

Excellent academic students with a Bachelor degree in medicine, biology, biomedical sciences, (bio) chemistry, or related studies

- from Erasmus MC
- from another Dutch university
- from an international university

Excellent non-academic students with a Bachelor degree from laboratory colleges or equivalent (only after passing a linking programme and nomination by their college)

- from HLO Rotterdam
- from another Dutch HLO
- from an international equivalent

The applicant should have a good working command of the English language, both oral and written. Foreign applicants whose native language is not English should submit the official score of either one of the approved English Language Tests: IELTS (International English Testing System) or TOEFL (Test of English as a Foreign Language). For IELTS the minimum score is 6. For TOEFL the minimum score is either 550 for the paper based test, or 213 for a computer based test. An English proficiency test is not required, when the applicant can prove with official certificates that English was the instruction language at secondary school or university.

Ad A. Excellent students with a Bachelor degree may apply. “Excellency” means that the student has completed his bachelor degree as one of the upper ten percent.

The students are invited for a personal interview with the selection committee to explain their motivation and their interest in translational research in the field of ‘Infection & Immunity’. This selection committee will consist of a minimum of four persons, with at least two persons from the Steering and at least two from the Programme Committee and with at least either the chairman or vice-chairman of both committees present.

During the research master programme, all non-medical students and all students from foreign universities will have to pass the compulsory theme ‘Infectious & Immune Diseases’ of the Bachelor medical curriculum (see part D, figure 5). This theme will be taught in English, thereby functioning as an introductory clinical course for the ‘Infection & Immunity’ research master programme.

Ad B. Excellent non-academic students with a Bachelor degree from laboratory colleges (or equivalent) will also be eligible for the programme. To be eligible they need to be nominated by the bachelor institution and, prior to entry in the research master programme ‘Infection & Immunity’ will have to pass a preparatory programme offered by the bachelor institution.

They have to apply to the selection committee by letter, submit their curriculum vitae and indicate their motivation to obtain a Master of Science degree in the field of ‘Infection & Immunity’ research. As a next step, the applicants are invited for a personal interview with the selection committee to complete the written information and to indicate the career they are aiming at. The programme may be adjusted on the basis of individual competencies and possible deficiencies, but at least students will have to be trained in clinical medicine in ‘Infection & Immunity’ by following and passing the exams of the compulsory 2nd year course ‘Infectious & Immune Diseases’.

Admission later into the programme is possible for students who have already gained significant academic knowledge in research, e.g. excellent medical students who have successfully passed the so-called ‘honours programme Infection & Immunity’ (see also part D).

The level of knowledge is judged by the selection committee and compared to the educational part of the programme. The candidate may be asked to pass examinations on clinical topics concerning ‘Infection & Immunity’. In addition the candidate is invited for a personal interview as described above and has to submit a research proposal.

According to individual assessment and the student’s previous experience, the programme can be adjusted to best serve individual needs, the precondition being that the high standards of the programme will be maintained at all times.

2.6 Credits

The total programme takes 84 weeks (120 ECTS) over a total period of 104 weeks. The programme is graphically depicted in figure 3(see page 18).

A general overview of ECTS of the master in Infection & Immunity is outlined below.

Programme Year 1	ECTS
First Summer Course	6
Course in 'Study Design'	4
Course in 'Classical Methods of Data Analysis'	6
Visiting seminars, journal clubs, research discussions Literature reading and orientation on research programmes Acquisition of specific knowledge of the areas of research	12
First Winter Course	6
Elective courses 1	7
Visiting seminars, journal clubs, research discussions Literature reading Performing research in the area of choice	19
total year 1	60
Programme Year 2	
Second Summer Course	6
Elective courses 2	7
Visiting seminars, journal clubs, research discussions Literature reading Performing research in the area of choice	15
Second Winter Course	6
Elective courses 3	7
Visiting seminars, journal clubs, research discussions Literature reading Research, stay abroad, writing and presentation of the Master Thesis	19
total year 2	60
total master programme	120

Elective courses can be chosen from the following list of non-extensive courses supplied by Erasmus MC:

Elective Courses	ECTS
Genetic Linkage Analysis: Model-free Analysis	1,4
Advanced Diagnostic Research	1,4
Advances in Population-based Studies of Complex Genetic Disorders	1,4
Epidemiology of Infectious Diseases	1,4
Clinical Trials and Drug Risk Assessment	1,4
Prognostic Research	1,4
Biomedical Research Techniques	1,4
Basic and Translational Oncology	1,4
SNP's and human diseases	1,4
Basic courses on Bio Informatic applications, tools & services	1,4
Virology course (week)	1,4
Basic course on Gene browsers	0,5
Molecular Diagnostics	1,4
In vivo imaging	1,4
Animal Imaging	1,4
Biology of Disease	4
Molecular and Cell Biology - A (orientation)	2
Molecular and Cell Biology - B (continued)	6
Developmental Biology	2
Neural signaling	4
Structure and organization of the nervous system	4
Sensory systems	4
Motor systems	4
Neurodevelopment	4
Neurological disorders	4
Molecular Neurobiology	1,4
Genetics and neurological diseases	1,4

Other courses by international scientific organisations (for instance the European Society of Clinical Microbiology & Infectious Diseases [ESCMID], the European Society for Immunodeficiencies [ESID], European Federation of Immunological Societies [EFIS], EpiEd, TropEd and others) can be attended as well.

3 Staff

3.1 Requirements for academic orientation

All course instructors, teachers and tutors are members of the (senior) scientific staff at the relevant research departments. See appendix III for the CV's of staff members.

Course instructors who are not senior staff members at an Erasmus MC research department, will be selected on the basis of national or international recognition of their expertise in the relevant field.

3.2 Quantity of staff

The Molecular Medicine postgraduate school has sufficient staff capacity for the two-year initial research master programme in Infection & Immunity. For the first year we have taken into account that extra capacity may be necessary due to unforeseen aspects. The Erasmus MC Department of Education (Opleidingsinstituut Geneeskunde) gives didactic support.

The staff/student-ratio (per 10 students) is calculated below.

Method

For the courses, every contact hour requires 3 hours for preparation; factor x 4 is used; 1 FTE=1680 hours.

Course type	Calculation	# hours
Summer courses	2 x 3 weeks of 6 contact hours/day, groups of 10: 2x3x5x6x4	720
Winter courses	2 x 3 weeks of 6 contact hours/day, groups of 10: 2x3x5x6x4	720
Course 'Methods of medical research'	3 weeks of 6 contact hours/day, groups of 10: 2x3x5x6x4	360
Seminars, research discussions etc.	70 weeks of 2 contact hours/day, 2 groups of 5: 70x2x5x2	1.400
Total number of hours		3.200
Total fte per group of 10		2

Outcome for the first 4 years

	Year 1 2009/2010	Year 2 2010/2011	Year 3 2011/2012	Year 4 2012/2013
Influx	10	12	15	15
# students (cum)	10	22	27	30
# teacher's hours	1600	3200	3200	3200
FTE's allocated	1	2	2	2
Staff/student-ratio	1:10	1:11	1:13,5	1:15

3.3 Quality of staff

Two committees support and supervise the MSc programme: the Education Board and the Examination Board. Both committees are part of the newly formed Erasmus MC Graduate School. The new research master Infection & Immunity follows the organisation already existing in the Erasmus MC Graduate School. The main responsibility of the Education Board is the quality control of the programmes. The Examination Board supports the research master programmes of Erasmus MC (at the moment four: Health Sciences, Clinical Research, Neuroscience and Molecular Medicine). The Board is charged with the selection and admission of new students, with monitoring student progress, with the supervision of the organisation of assessments and with the awarding of degrees.

Most staff also participate in the curriculum ErasmusArts, the bachelor and master of Medicine. All students in the Medicine curriculum write a master's thesis on the basis of a research project they have conducted. All staff has ample experience in coaching medical students in research projects and writing of the master's theses. Also, all staff has been and is involved in PhD research projects as co-promotor or promotor (appendix 3).

Furthermore, as of 2009 Erasmus MC starts with an educational programme for all educational staff, which gives successful participants a 'basic educational qualification' (basiskwalificatie onderwijs).

4 Services

4.1 Facilities

The research master Infection & Immunity will be part of the Erasmus MC Graduate School and is allowed to use all the facilities from Erasmus MC as well as the Erasmus University. Special facilities most relevant for this master are:

- The educational learning environment of Erasmus MC, such as the up-to-date biomedical library, the E-learning environment, the computer facilities for students and the classrooms and lecture halls.
- The cooperation between and integration of the various research master programmes at Erasmus MC.
- The integrated multidisciplinary research groups.
- A backbone of compulsory summer and winter courses (confection), supplemented with individualised (tailor-made) education.
- The excellent facilities for (pharmaco)genomics, biomics, proteomics and in vivo and animal imaging, such as the Core Facility for genomics and proteomics and the Bio Informatics Department.
- The presence of BSL3+ facilities and connected reference laboratories.
- The vast experience with animal models.
- The availability of several large patient cohorts with extensive clinical and genetic characterisation.
- The broad spectrum of and vast experience with bone marrow and solid organ transplantation programmes and facilities, including pharmaco-epidemiology and –immunology.

4.2 Tutoring

From the moment of entering the master programme, students will be assigned a tutor, who will supervise and support a small group of master students (max. 5) in the orientation phase and help them with literature reading. Initially, a maximum of 10 students will be admitted to the Research master curriculum yearly. It is anticipated that in the future, with influx of paying foreign students, this maximum will increase to 15. So a maximum of two or three tutors, respectively, will coach the student groups.

When the student has selected a specific field of research he/she will be allocated a coach, who will function as the prime supervisor during the research phase. This coach will closely monitor the individual student's progress and his/her educational needs. All coaches will be professors or senior staff members in the student's chosen research department and belong to the postgraduate school Molecular Medicine.

At least once every two weeks the coach will discuss progress with the student.

In case of a conflict between student and coach, a committee consisting of the chairman and vice-chairman of both the Steering and Programme Committees will try to resolve the conflict by hearing both student and coach.

Above this, the general study facilities, offered by the Erasmus University, can assist the students. One of these facilities is the buddy programme for foreign students. Others are the student psychologists and the educational dean.

As far as the information provision to the students is concerned, the following can be said. For all relevant courses, the electronic learning environment 'Blackboard' will be used. Via Blackboard, students will have access to all information relevant to the courses of the programme. Blackboard is also equipped with a discussion platform, portfolio and e-learning facilities.

The scores of exams will be registered in OSIRIS. This registration system is accessible for students via OSIRIS-online. In this way, students always have access to all data concerning their study progress.

5 Internal quality assurance system

5.1 Systematic approach

Erasmus University – 3-year circle

A system of quality evaluations, self-assessments and self-diagnosis is currently being developed for all research master programmes at Erasmus MC (see appendix 4a). The purpose of this system is to implement regular evaluations of the different (aspects of the) programmes to ensure continuity and to ensure the high levels of quality aimed at in the short and long term. This system will also be used in preparation of site visits in the accreditation process of the different research master programmes. In order to be able to self-diagnose potential barriers in renewing the accreditation of the programmes, Erasmus University has decided to perform a full-scale internal evaluation three years before the end of the accreditation term.

Periodical evaluations

The education board of the Erasmus MC graduate school supervises the quality of the master's programme. The board discusses course and programme evaluations. In order to maintain and improve educational quality the graduate school has a procedure for evaluating its educational activities. All courses are evaluated separately (orally and/or written) and educational processes are evaluated on a regular basis. The Education Board verifies that the necessary improvements are actually implemented by the programme directors and inspects the overall quality of the programmes. The programme directors of the different specialisations meet regularly to discuss the study programmes.

5.2 Involvement

Important in quality assurance is involvement of all different groups with information on the programme, staff, students, alumni, fellow researchers in the professional field and educationalists. The Erasmus MC Graduate School involves each group in the evaluation process as described below (see also the schedule in appendix 4b, in Dutch)

Staff

Lecturers and coaches are involved in the evaluation process. They participate in evaluation meetings with students and are regularly asked to fill out an evaluation form on the educational process.

Students

At the end of each course the students are asked to fill out an evaluation form. These evaluations offer information on a number of general and detailed aspects of the quality of the course. Participants are asked for their opinion on different items.

Regularly, students fill out an evaluation form on the educational process. These evaluations offer information on the educational quality of the staff involved and on the teaching learning environment. In oral evaluations special attention will be paid to aspects concerning study progress.

Alumni

Participation of alumni in the evaluation process is most important because they can offer information on the question if the curriculum has prepared them adequately for their current or previous jobs. The master of Infection and Immunity is developing methods to keep in contact with its alumni in order to be able to get the necessary information after graduation.

Professional field - researchers

The professional field consists of researchers both at Erasmus MC and at other universities and research institutions. Participation of the researchers in the evaluations is foreseen on the important parts of the academic quality and the standard of the exams and the Master thesis. Therefore researchers from both Erasmus MC and fellow institutes will be asked to comment on these subjects regularly.

Professional field - educationalists

Where fellow researchers are able to judge the quality of the academic standard of the research involved, educationalists are able to judge the quality of the teaching-learning environment. Therefore they will be frequently asked to comment on these aspects of the research master.

6 Conditions for continuity

6.1 Graduation guarantee

Erasmus MC guarantees to all students who have started the programme that the curriculum can be finished completely. The programme of the research masters is embedded within the Erasmus Molecular Medicine Postgraduate School, which is recognised since 1994 by the Dutch Academy for Arts and Sciences (KNAW) and which is an integral part of Erasmus MC.

For students who have a bachelor's degree in Medicine and who fulfil the admission requirements as mentioned in paragraph 2.5, the 'Infection & Immunity' research master programme can be integrated in the Erasmusarts curriculum as shown in figure 6 (page 36). For this purpose, 3 weeks of the course "Methods of medical research" in the 1st year of the EA 2008 Master phase and 21 weeks of the research elective and 6 weeks of the clinical electives in the 2nd year of the EA 2008 Master phase may be used for the research master 'Infection & Immunity' course. This leads to an extension of the six-year medical curriculum by 54 weeks.

From the perspective of recruiting other than medical students (Biology, Biomedical sciences, Biochemistry, Laboratory colleges etc.), the introduction of the BaMa structure has great advantages. Students in the possession of a relevant bachelor's degree, can enter the 'Infection & Immunity' research master programme when they fulfil the admission requirements as mentioned in paragraph 2.5. For these students, special attention must be given to general academic education, including the subjects of medical law, ethics and philosophy. These topics are covered in the regular medical curriculum. For other than medical students ('zij-instroom') these topics will be touched upon in the last week of the 2nd summer course (see Appendix 1).

6.2 Investments

Long-term investments specifically for the research master Infection & Immunology are not necessary. As mentioned before, the research master can make use of existing facilities at Erasmus MC en Erasmus University Rotterdam.

The staff will invest the necessary time in tutoring, as described in chapter 3.

The Erasmus MC pays the participating departments for every student:

- € 4.000 upon entry of the program;
- € 7.500 at graduation;
- € 1.250 to cover costs for a stay abroad.

These revenues suffice to cover the costs of the departments, since the programme uses existing facilities.

6.3 Financial provisions

The (financial) figures of the programme are presented in the table below.

ACADEMIC YEAR	2009	2010	2011	2012	Structural
Annual influx	10	12	15	15	15
Size of student population	10	22	27	30	30
Total % of students from elsewhere (zij-instromers)	20%	20%	33%	40%	40%
Total # of students from elsewhere (zij-instromers)	2	4	9	12	12
Total # of students graduating	-	-	9	11	14
BUDGET YEAR					
BUDGET YEAR	2009	2010	2011	2012	Structural
Budget upon entry (€)	-	40.000	48.000	60.000	60.000
Budget at graduation (€)	-	-	-	67.500	105.000
% Students studying abroad	-	50%	50%	50%	50%
# Students studying abroad	-	5	6	7	7
Budget for students studying abroad (€)	-	-	6.250	7.500	8.750
Starting budget from dean (€)	PM	PM	PM	PM	PM
Starting budget from EUR (€)	-	-	-	50.000	60.000 (+)
Budget foreign students (€)	PM	PM	PM	PM	PM
TOTAL INCOME (€)	-	40.000	54.250	185.000	233.750
TEACHING EXPENSES					
Teachers hours (€)	1600	3200	3200	3200	3200
Teaching expenses (€)	90.000	180.000	180.000	180.000	180.000
Other expenses (€)	PM	PM	PM	PM	PM
TOTAL EXPENSES (€)	90.000	180.000	180.000	180.000	180.000
RESULT (excl budget for foreign students) (€)					
RESULT (excl budget for foreign students) (€)	-90.000	-40.000	-125.750	5.000	53.750
CUMULATIVE RESULT (€)	-90.000	-130.000	-255.750	-250.750	-197.000

(+) = continues next year, max. 30 students at €5.000, total starting budget €150.000

The table shows that there will be an initial loss, but that in the end, the income covers expenses. The initial loss is principally due to factors proper to the internal budget system. The system has a time lag of a year. Moreover, of the total budget of € 12.000 per student, the largest part (€ 7.500) is payed upon graduation. The Erasmus MC will cover the initial losses.

Part D:
The medical curriculum Erasmusarts 2008

In September 2008, Erasmus MC will implement the Bachelor/Masters structure (BaMa) in its regular medical curriculum (codename ErasmusArts 2008 or EA 2008). The lay-out of the proposed new curriculum is depicted in figure 5. When compared to the current curriculum, the changes in EA 2008 are:

- In the first year a new integrated introductory course is proposed, teaching normal anatomy and functioning of the human body.
- A 'Minor' is introduced at the beginning of the third year. The student can choose subjects for this Minor from within Erasmus MC, but also from courses provided by other faculties of the Erasmus University Rotterdam (e.g. Economics, Law, Philosophy).
- The last parts (part D) of the major themes of the core curriculum have been moved from the Bachelor phase to the first year of Master phase (4th year) to introduce a series of integrated themes with the intention to create a moment of repetition/rehearsal before students start their clerkships.
- The Research Elective is positioned at the end of the sixth year together with the Elective Clerkships to form the so-called 'Schakeljaar'.

For medical students who have successfully finished their Bachelor in Medicine and who fulfill the admission requirements as mentioned in paragraph 2.5, the 'Infection & Immunity' research master programme can be integrated in the EA 2008 curriculum as shown in figure 6. For this purpose, 3 weeks of the course "Methods of medical research" in the 1st year of the EA 2008 Master phase and 21 weeks of the research elective and 6 weeks of the clinical electives in the 2nd year of the EA 2008 Master phase may be used for the research master 'Infection & Immunity' course. This then leads to an extension of the six-year medical curriculum by 54 weeks.

From the perspective of recruiting other than medical students (Biology, Biomedical sciences, Biochemistry, Laboratory colleges etc.), the introduction of the BaMa structure has great advantages. When fulfilling the admission requirements as mentioned in paragraph 2.5, they can enter the 'Infection & Immunity' research master programme after successfully finishing their Bachelor elsewhere.

Special attention must be given to academic development, including the subject of medical law, ethics and philosophy. These topics are covered in the regular medical curriculum. For other than medical students ('zij-instroom') these topics will be touched upon in the last week of the 2nd Summer Course (see Appendix 1).

The following information on the current regular medical curriculum is relevant for this request for accreditation:

- Studiegids 2007-2008, see hyperlink www.erasmusmc.nl/Onderwijs/geneeskunde/179518/179530.
- The guide for electives for medical students "Keuzeonderwijs en –onderzoek 2007-2008". Information concerning the period 2006-2007 is also available on the EUR website via hyperlink www.eur.nl/fgg/ow/koz/.
- The report, prepared for the assessment of the medical curriculum "Zelfstudie als voorbereiding op de visitatie 2003". See www.erasmusmc.nl.
- The report of the assessment in 2003 by the "Vereniging van samenwerkende Nederlandse Universiteiten (VSNU)". See www.erasmusmc.nl.
- The ErasmusArts 2008 document as sent to the dean for approval in May 2007. see www.erasmusmc.nl.

Figure 5: The Bachelor/Masters medical curriculum ErasmusArts 2008 as per September 2008

Jrwk	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27																	
Curwk	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42																	
BA1	1A (-)																1B (1.2)										1C (2.2)										Pr											IT											
	De gezonde mens, incl methodologie 11 (9+2)																Stoornissen in het 16										milieu interieur										Voeding en 13										BO	metabolisme										1	42
	Lijnonderwijs PKV-CA, MPO																																																										
BA2	2A (1.3)																Pr		keuze										2B (2.1)										2C (4.1)										IT										
	Abnormale celgroei 13																Zorgst	M&T	KOW										Infectie- en Immunziekten 16										Bewegingsapparaat 5										1	42									
	Lijnonderwijs PKV-MT/CA, MPO																																																										
BA3	keuze																3A (3.1)										3B (3.2)										3C (4.2)										IT												
	Minor 10																Stoornissen in de 14										reproductieve cyclus										Dysfunctie van hersenen en zintuigen 13										Populatie 4										1	42	
	Lijnonderwijs PKV-MT/CA, MPO																																																										
MA1	4A (4.3)																4B (-)										Coschap																																
	Methoden v Onderzoek 3			Geïntegreerd patiëntentema 20																							Ra- ICK Interne Geneeskunde 1 1 10										ICK Heelkunde 1 6										42												
	Lijnonderwijs PKV-MT/CA, MPO																Lijnonderwijs RPG, Farmacie																																										
MA2	Coschap																																																										
	Heelkunde 4				ICK Kindergeneesk 1 5					ICK Psychiatrie 1 5					Neurologie 5					ICK Vrouwz & Verlosk 1 5					ICK Derma 1 3			KNO 3			Oogh. 3			Huisartsgen. 5					42																				
	Lijnonderwijs RPG, Farmacie																																																										
MA3	Coschap																																																										
	Sociale Re- Gnk val 2 1						Keuzecoschap(pen) 6						Oudste coschap 12																Onderzoek Keuzeonderzoek 21										42																				

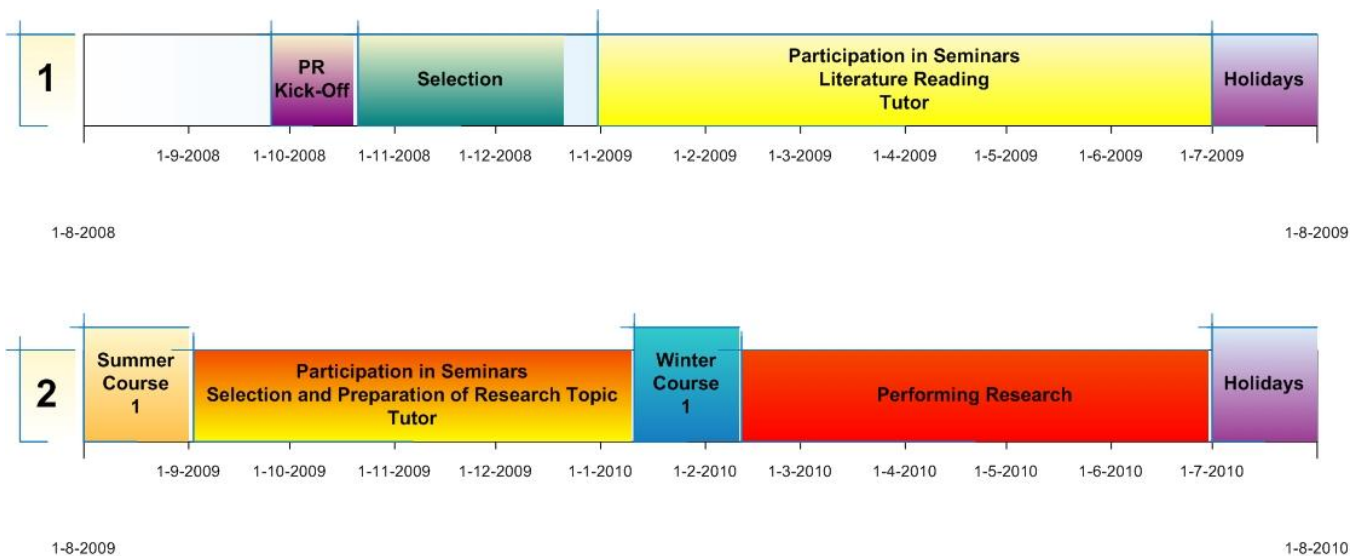
Figure 6: Research Master programme and regular Bachelor/Masters medical curriculum ErasmusArts 2008

Jrwk	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27					
Curwk	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42		
BA1	1A (-)																1B (1.2)					1C (2.2)							Pr				IT														
	De gezonde mens, incl methodologie 11 (9+2)											Stoornissen in het 16					milieu interieur							Voeding en 13			BO	metabolisme				1	42														
	Lijnonderwijs PKV-CA, MPO																																														
BA2	2A (1.3)											Pr		keuze		2B (2.1)							2C (4.1)					IT																			
	Abnormale celgroei 13											Zorgst 2		M&T	KOW	4				16							Bewegingsapparaat 5					1	42														
	Lijnonderwijs PKV-MT/CA, MPO																																														
BA3	keuze											3A (3.1)					3B (3.2)							3C (4.2)					IT																		
	Minor 10											Stoornissen in de 14					reproductieve cyclus							Dysfunctie van hersenen en zintuigen 13					Populatie 4				1	42													
	Lijnonderwijs PKV-MT/CA, MPO																																														
Summercourse	Classical Meth																Wintercourse																														
1	Study Design Data Analysis																1																														
	3			3			4			Research Masters 12												3			Research Masters 20																						
Summercourse	2																Wintercourse																														
2	2																2																														
	3			Research Masters 19													3			Research Masters 20																											
MA1	4A (4.3)				4B (-)												Coschap																														
	Methoden v Onderzoek 3			Geïntegreerd patiëntentema 20												Ra- ICK Interne Geneeskunde diol 1 1 10																ICK Heelkunde 1 6			42												
	Lijnonderwijs PKV-MT/CA																																														
	Lijnonderwijs RPG, Farmacie																																														
MA2	Coschap																																														
	Heelkunde 4				ICK Kindergeneesk 1 5				ICK Psychiatrie 1 5				Neurologie 5				ICK Vrouwz & Verlosk 1 5				ICK Derma 1 3				KNO 3			Oogh. 3			Huisartsgen. 5			42													
	Lijnonderwijs RPG, Farmacie																																														
MA3	Coschap																																														
	Sociale Re- Gnk val 2		Oudste coschap 1 12																																												

The Honours programme 'Infection & Immunity'

When entering the 2nd Bachelor year of their medical curriculum, excellent medical students will be invited for the honours programme 'Infection & Immunity'. "Excellency" means that the student has completed his/her 1st Bachelor year as one of the upper ten percent. The goal of the honours programme is to offer these excellent medical Bachelor students a 2-year parallel track to be trained in the basics of translational research at the crossroads of infection and immunity by top-quality research groups at Erasmus MC. After successfully participating in and passing the exams of this honours programme they will be qualified to enter the research master programme 'Infection & Immunity'.

Figure 7: Schematic outline of the honours programme 'Infection & Immunity'



The honours programme is outlined in figure 7. Theoretical and practical training and research will be closely integrated. After presentation of the honours programme in the 2nd year of the Bachelor phase (last week of September), interested students will be invited for a personal interview with the selection committee to explain their motivation and their interest in research in the field of 'Infection & Immunity'. When admitted to the honours programme, students are assigned a tutor and participate in seminars, journal clubs, literature discussions and research meetings of the various research groups involved (see appendix 2) starting in January of the 2nd year of the Bachelor phase. It is expected that between January and July (26 weeks) they then attend such meetings at least once a week in order to get acquainted with the different disciplines, their research groups and research themes. They will also form 'literature reading classes' (max. 5 students) under supervision of their tutor, meeting every 2 weeks to discuss relevant articles.

At the start of their 3rd Bachelor year (and only after successfully passing the core medical curriculum courses 'The Healthy Person (1A)', 'Interior Milieu (1B)', 'Nutrition and Metabolism (1C)', 'Abnormal Cell Growth (2A)', 'Infectious & Immune Diseases (2B)') they will participate in summer course 1 (3 weeks; see appendix I for a more detailed description). After this summer course the students will choose their specific research topic. After they have made their choice, a coach is assigned to the students, who will guide him/her through the remaining period (1 year) of the honours programme. The coach is the leading scientist or an experienced senior staff member of the research theme chosen (see appendix 2).

The period following the 1st summer course (18 weeks) will be devoted to the acquisition of specific knowledge of the area of research and writing of the research proposal (to be presented at the 1st winter course). They will continue to attend the literature reading classes, as well as research discussions, seminars, journal clubs and literature readings on their research subject.

Thereafter they will attend winter course 1 (3 weeks) and at the end of this course present their research proposal.

They will then enter the research phase of their honours programme (23 weeks), during which they are obliged to attend the research discussions, seminars, journal clubs and literature readings on their research subject, as well as the ongoing 'literature reading classes'.

At the end of this research period and to successfully complete the honours programme 'Infection & Immunity' students will need to have:

- passed all exams
- shown good participation in research discussions / seminars at their chosen research department as assessed by their tutor/coach
- written a structured research report and based on this a proposal for further research

Students will keep record of the meetings they visited, articles they discussed and other assignments using a portfolio, which will be controlled by their coach.

To this aim, as in the regular medical curriculum at Erasmus MC, an 'Infection & Immunity' honours programme Blackboard site will be created so that students, tutors, coordinators and other teachers can communicate with each other. Course rosters, course documents, announcements, discussion board, assignments and the portfolios will all be published.