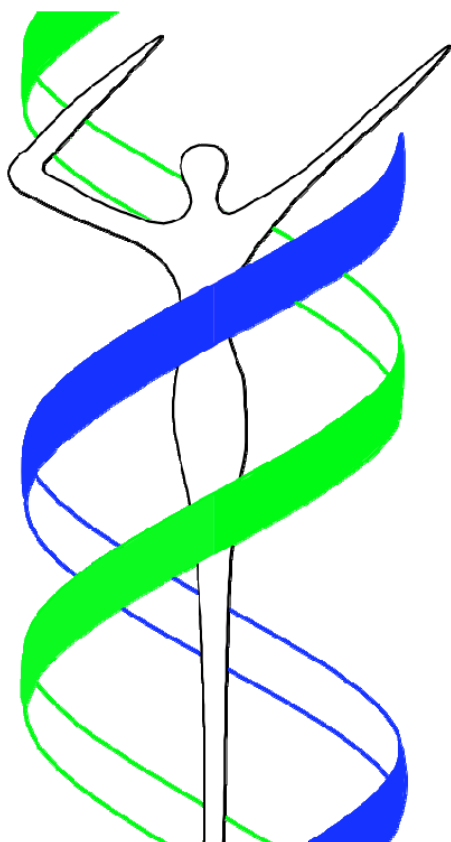


Teaching Program of Biomedical Science



*For PhD students of
Biomedical Sciences
at Erasmus MC*

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PhD Teaching Program Committee

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Note: For readability only the male nouns were employed in this text. When applicable, please, read she/her instead of he/his.

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Overview of the Biomedical Science PhD program

Becoming a skilled, critical and independent researcher is the most important criterion for receiving a PhD degree at Erasmus MC. This capacity is mainly monitored by the supervisor and (co)promotor of the department, in consultation with the coaching committee (see below). The research project should culminate in (first author) paper(s) and a well written thesis. Besides doing research, PhD students from 7 departments at Erasmus MC (Cell Biology, Genetics, Clinical Genetics, Reproduction and Development, Forensic Molecular Biology, Biochemistry and Bio-informatics) also have to follow the Biomedical Science PhD program, which is briefly described below.

The Biomedical Science PhD program is embedded in the Graduate School MGC South West Netherlands (shortly: MGC). The additional requirements, courses, and modules of this program are aimed at further improving education and training of PhD students at Erasmus MC. In addition, the Biomedical Science PhD program incorporates obligatory courses offered by the Erasmus MC. We adhere to the Erasmus MC requirement that a total of 30 training credits (ECTS) points are obtained by the student at the end of the PhD. Students can obtain ECTS points for each course and lecture they follow.

Participation in the Biomedical Science PhD program is in principle mandatory for all PhD students working in one of the 7 participating departments. There are obligatory (see pages 5, 6 for overview) and non-obligatory (see page 13 for overview) parts to the program. The student is free to compile his own individual program as far as the non-compulsory part is concerned. The PhD student will receive a certificate after a course has been followed (important for obtaining ECTS points). PhD students should list the courses and lectures in a portfolio as part of their CV at the end of their thesis. It is important to personally keep track of the courses and lectures followed.

A 'teaching and coaching plan', that describes the research project of the PhD, as well as tasks, obligations and supervision issues, and courses/seminars to be followed, should be drawn up by the PhD student together with the supervisor. The plan is discussed with supervisor and PhD coordinator (i.e. Marjoleine van Berckel Bik) at the onset of the PhD. At this point all rules and regulations with respect to the PhD research project and the obligatory and non-obligatory parts of the PhD program are explained. The 'teaching and coaching plan' should be registered on forms, copies of which should be handed to "personeelszaken" and to the coordinator of the Biomedical Science PhD program (Marjoleine van Berckel Bik), who will keep track of the plan and of the progress of the PhD student.

It is recommended that the courses/seminar choices are also presented at the end of the first year to the coaching committee (see below). In agreement with the 'teaching and coaching plan' students register for courses and seminars that they find interesting. Registration is usually done through the websites of either the MGC postgraduate school or MolMed postgraduate school.

Coaching of PhD students

It is considered of great importance that PhD students function optimally, and consequently, we want to ensure that their research projects come to fruition within the set time limits. To reach this goal, a coaching committee ("begeleidingscommissie") will be formed for each PhD student, consisting of 2 scientists that are familiar with the field of research of the student's project. These scientists are invited by the PhD student and daily supervisor, and can be from inside or outside the 7 institutes. The PhD student will have a say in the choice of members of the coaching group. There will be no relationship between membership of the coaching group and that of the promotion or opposition committees which are normally formed at the end of the PhD project. The coaching group should have been formed 6 months after the start of the appointment of the PhD student.

First year of the PhD

The first year of the PhD contains several very important courses and evaluation moments. They are explained below.

Basic courses. Students have to follow three basic courses entitled "Cell and Developmental Biology", "Genetics", and "Biochemistry and Biophysics" (see page 7 and further). The courses are concluded by an exam. As most PhD students employed within the 7 institutes have a background in cell and molecular biology and/or biochemistry, we expect them to pass all 3 exams. Students that fail an exam are entitled to a re-examination, which should take place maximally 4 weeks after the first exam. The re-exam will be given in consultation with the respective course coordinator. Re-exams can be in written or oral form, in the latter case more than one examiner can be present (for example, the course coordinator and one or more of the lecturers). Students that fail both the first exam and the re-examination have to do the course again in the next year, and pass the exam. Only after passing an exam will the student obtain ECTS points for a given course. If a PhD student fails the exams for 2 or 3 of the basic courses he should not continue with the PhD. If a student does not pass 1 out of the 3 courses he can continue but in this case the 'progress report' (see below) becomes very important. In case of failure for an exam the Department head, the daily supervisor, the PhD program coordinator and the scientific director come together to discuss progress of the PhD student.

Progress report. The PhD student will be invited by the coaching group and daily supervisor to present the progress of his project at the end of the first year of his contract ('first year presentation'). The student will also present a view of his future plans. The progress report serves as an important evaluation moment of the PhD. In this evaluation the performance in the basic courses is also included.

Progress meetings. The PhD student and his supervisor will have progress meetings ('beoordelingsgesprekken') after 6 and 9 months to discuss the development of the research project and progress of the PhD student, including the performance in the mandatory PhD program. Forms for this meeting are sent by the personnel department ('personeelszaken'). Forms should be filled out and handed back, the original to "personeelszaken" and a copy for Marjoleine. In case of failure for one of the required modules of the PhD program (see above) this is noted down in the progress report and the PhD contract can be continued but should become a 'voorwaardelijk dienstverband'.

Problems during the PhD and feedback

In case of problems, for example between the PhD student and his supervisor, the PhD student can consult a 'confidante', a person who will regard all information received from the PhD student as confidential and who will act in the best interest of the PhD student only. We have 7 persons (one from each participating institute) acting as 'confidante' (see below). The PhD student is free to go to any of the 'confidantes' to ask for assistance. The confidante in turn can seek contact with the PhD student, coaching group, or the daily supervisor when necessary. This division of tasks ensures that coaching groups and confidantes not only evaluate and help the PhD student, but also monitor guidance by (new) supervisors. This information is used to optimise future guidance.

Confidantes

Vincenzo Bonifati
Oscar Lao
Willy Baarends
Jeroen Essers
Tokameh Mahmoudi
Replacement to be announced
Niels Galjart

Clinical Genetics
Forensic Molecular Biology
Reproduction & Development
Genetics
Biochemistry
Bioinformatics
Cell Biology

Overview of mandatory part of PhD program

(exemptions are possible in individual cases for 2.1-2.6)

1 Biomedical Science PhD courses and tasks

Year	Course/task and approximate period	Explanation on page	ECTS points
1	Cell and Developmental Biology (7 lectures, ~1.5 hours per lecture) January - March - followed by exam Coordinator: Niels Galjart	7	3
	Genetics (6 lectures, ~1.5 hours per lecture) April - May - followed by exam Coordinator: Manfred Kayser	7, 8	3
	Biochemistry and Biophysics (6 lectures, ~1.5 hours per lecture) October - November - followed by exam Coordinator: Joyce Lebbink	8, 9	3
	At end of year 1 presentation of 1 st year results to supervisor and committee (2 members)	4	1
2	Literature course The length of a literature course depends on the number of participating students (4 minimum). At this moment six literature courses with different topics are organized per year.	9, 10	2
3	Participation in the Junior Science program. In this program high school students (VWO/gymnasium) undertake a lab project. PhD students will act as an instructor and supervisor to a pair of these students. Time spent in the lab is ~1 week.	10	1,5

2 MGC and Erasmus MC PhD courses

2.1 Safe Laboratory Techniques ("Veilig werken in Laboratoria")

A 'one day' course that is intended to refresh the memory and to supplement courses that may have been followed earlier. The following points will be addressed: safe microbiological techniques; radionuclides; carcinogenic agents; blood, viruses; radiation. This course has to be taken in the first year. The course is also open for other new personal of the MGC. The course will be given twice a year depending on the interest. The course is given in Dutch (mostly in the spring) and English (mostly in the winter). The course will be given in collaboration with the Department VSM of the LUMC.

Apply through the MGC website: <http://www.medgencentre.nl> or through the Boerhaave website: <http://www.boerhaavenet.nl>.

2.2 Working with Test Animals ("Proefdierkunde")

Intended for those PhD students that will work with test animals in vivo. The Medical Faculties of Leiden and Rotterdam are offering a course with official recognition. Apply to the LUMC in Leiden <http://intranet.lumc.nl/kwo/scholing.htm> or the faculty in Rotterdam <http://www.erasmusmc.nl/onderwijs/>.

2.3 Biomedical English Writing and Communication

This course has two main objectives: (a) to provide practical guidelines for writing well-structured and fully readable biomedical articles and (b) to provide a framework for effective oral presentations. Apply to the Faculty in Leiden (for application of more information see <http://www.phd-courses.leidenuniv.nl> or in Rotterdam <http://intranet.erasmusmc.nl/onderzoeksbeleid/carriere/phdprogram/coursesintra/english/?language=en>). Students from Rotterdam should do this course in their 2nd year, so that they have enough data to complete an article by the time the course ends.

2.4 Statistics

This is a course on general statistics and methodology, given once a year, in the fall (see http://www.nihes.nl/site/index.php?id=482.894.0.0.1.0&course_id=30#30). Although many PhD students have already taken courses in statistics during their undergraduate studies, we consider this basic course important since many research approaches in biomedical sciences rely heavily on statistics. For application and information see to be filled in later).

2.5 Research Integrity

This course aims to share experiences, analyze cases, discuss ethical dilemmas and steps to possible solutions, and reflect on the ethical and institutional topics researchers are faced with.

2.6 Work and literature discussions

These are activities within the own Institutes. For Erasmus MC PhD students the Literature course is compulsory.

2.7 MGC Promovendi workshop

PhD students of the MGC will present their work to each other followed by discussions. The format is a yearly three-day meeting outside town. These workshops generally take place in spring. Further information will appear in the MGC-bulletin and on the website. PhD students will also receive a personal invitation.

Summary of mandatory 1st year Biomedical Science PhD courses

Cell and Developmental Biology (CDB) course

Coordinator: Niels Galjart

The course consists of 7 (1.5-2 hours) lectures, given on Wednesdays from 4 pm onward. The course runs from January-March. Although we will not teach from the Alberts book, it is used as a basis for the lectures (the Alberts book is handed out by the department as a gift to the PhD student). Papers will be sent out by e-mail. The exam immediately follows the lectures series. It consists of 7 open questions, one question per lecture. It is not allowed to use the Alberts book during the exam. Questions will be provided and graded by the lecturers.

Overview of CDB lecture series and literature:

(see http://www.erasmusmc.nl/medical_genetics/education/mgc/ for extended syllabus)

Session	Title	Lecturer
1	Gene expression	Sjaak Philipssen
Alberts: Chapter 6 pages 331-336 and 339-343, Chapter 7 pages 415-426, 437, 439-450 and 462-466.		
2	DNA metabolism	Roland Kanaar
Alberts: Chapter 5 pages 263-316.		
3	Cell structure	Niels Galjart
Alberts: Ch 6, pages 329-385; Ch 7, pages 493-497; Ch 10, pages 617-629; Ch 12, pages 695-712 and 723-745; Ch 14, pages 813-827; Ch 16, pages 965-1010.		
4	Cell signalling	Gert Jansen
Alberts: Chapter 15, Chapter 16 pages 1031-1034 and Chapter 18. Papers: Gerdes, J.M., E.E. Davis, and N. Katsanis, The vertebrate primary cilium in development, homeostasis, and disease. <i>Cell</i> , 2009. 137(1): p. 32-45; Berbari, N.F., A.K. O'Connor, C.J. Haycraft, and B.K. Yoder, The primary cilium as a complex signaling center. <i>Current biology : CB</i> , 2009. 19(13): p. R526-535.		
5	Developmental Biology	Robbert Rottier
Alberts (see CD of the Alberts text book): Chapter 22 pages 1363-1371 and 1378-1383. Paper: Sean Carroll, <i>Cell</i> 134, pp 25-36, 2008.		
6	Stem cells	Catherine Robin
Alberts (see CD of the Alberts text book): Chapter 22 pages 1378-1381 and Chapter 23 pages 1480-1483. Papers: Maherali & Hochedlinger, 2008, <i>Cell stem cell</i> , Vol. 3, page 595-605; Yu and Thomson, 2008, <i>Genes and development</i> , Vol. 22, page 1987-97; Takahashi et al 2007 <i>Cell</i> 131, 1-12; Keller, G. (2005). <i>Genes Dev</i> 19, 1129-1155; Jaenisch and Young, 2008, <i>Cell</i> , Vol. 132, page 567-582; Boisset, J.C. and C. Robin, On the origin of hematopoietic stem cells: progress and controversy. <i>Stem cell research</i> , 2012. 8(1): p. 1-13.		
7	Chromatin domain organization of eukaryotic genomes	Bas van Steensel

Genetics course

Coordinator: Manfred Kayser

Six (1.5-2 hour) lecture sessions. The exam immediately follows the lectures series. It will consist of 6 open questions, one question per lecture. Questions will be provided and graded by the lecturers.

Overview of Genetics lecture series:

(see http://www.erasmusmc.nl/medical_genetics/education/mgc/ for extended syllabus)

Session	Title	Lecturer
1	Basic principles of genetics	Aida Bertoli
2	From DNA to diseases	Vincenzo Bonifati
3	Cancer genetics	Riccardo Fodde
4	Epigenetics	Joost Gribnau
5	Human evolutionary genetics	Manfred Kayser
6	Population genetics	Oscar Lao

Recommended review papers and text books.

Papers:

Michael L. Metzker. Sequencing technologies – the next generation. Nature Genetics 2010; Vol. 11: 31-46.

Tucker T, Marra M, Friedman JM. Massively Parallel Sequencing: The Next Big Thing in Genetic Medicine. The American Journal of Human Genetics 2009; Vol. 85: 142-154.

Altshuler D, Daly MJ, Lander ES. Genetic mapping in human disease. Science 2008; Vol. 322: 881-888.

Rosenberg NA and Nordborg M. Genaeological trees, coalescent theory and the analysis of genetic polymorphisms. Nature Reviews Genetics 2002; Vol. 3: 380-390.

Text books:

Human Molecular Genetics by Tom Strachan and Andrew Reeds, Garland Science / Taylor and Francis.

Human Evolutionary Genetics: origins, peoples & diseases by Mark A. Jobling, Matthew Hurles, and Chris Tyler-Smith, Garland Science / Taylor and Francis.

Biochemistry and Biophysics (BB) course

Coordinator: Joyce Lebbink

Consisting of 6 (1.5-2 hour) lecture sessions. assuming basic knowledge from courses taught from 'Molecular Biology of the Cell', Alberts et al, 5th edition. The exam immediately follows the lectures series. It will consist of 6 open questions, one question per lecture. Questions will be provided and graded by the lecturers. The exam immediately follows the lectures series.

Overview of BB lecture series and literature:

(see http://www.erasmusmc.nl/medical_genetics/education/mgc/ for extended syllabus)

Session	Title	Lecturer
1	Forces between molecules	Titia Sixma
<p><u>Chapters in Alberts:</u> Ch 2 pp 45-53 and pp 59-63, Ch 3 pp 153-157. <u>Paper:</u> Falconer et al, Applications of Isothermal Titration Calorimetry, J. Mol. Recogn. 23, 395-413, 2010.</p>		
2	Protein Structure	Titia Sixma

Session	Title	Lecturer
<p><u>Chapters in Alberts:</u> Ch 3 pp 125-154, Ch 8 pp 510-514.</p> <p><u>Additional papers:</u></p> <ul style="list-style-type: none"> - GE Healthcare, Protein Purification Handbook. - McCoy, Protein Crystallography with Coffee. 		
3	Nucleic Acid Structure	Claire Wyman
<p><u>Chapters in Alberts:</u> Ch 2 pp 61-62, Ch 4 pp 197-201.</p> <p><u>Other text books available on line in pub med:</u></p> <p>4.1 Structure of Nucliec Acids (<u>Molecular Cell Biology</u>, Lodish, Berk, Zipursky, Matsudaira, Baltimore and Darnell) http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=mcb&part=A802#A803 DNA topology is introduced in a section from Biochemistry by Berg, Tymoczko and Stryer http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=stryer&part=A3783#A3786</p>		
4	Kinetics	Joyce Lebbink
<p><u>Chapters in Alberts:</u> Ch 2 pp 66-81 and pp 118-119, Ch 3 pp 158-173, Ch 5 pp 268-270. <u>Paper:</u> Advanced optional reading that extends the discussion on fidelity from Alberts pp 268-270; Johnson KA, The kinetic and chemical mechanism of high-fidelity DNA polymerases, Biochimica and Biophysica Acta 1804, 1041-1048, 2010.</p>		
5	Fluorescence Spectroscopy	Niels Galjart
<p><u>Chapters in Alberts:</u> Ch 9 pp 579-603.</p> <p><u>Other text:</u> Wikipedia : fluorescence; http://www.invitrogen.com/site/us/en/home/References/Molecular-Probes-The-Handbook/Introduction-to-Fluorescence-Techniques.html; Chapters 6 and 14 of "Green Fluorescent Protein: Properties, Applications, and Protocols; Martin Chalfie (Editor), Steven R. Kain (Editor).</p> <p><u>Papers:</u> McKinney et al. Nat Methods (2009) vol. 6 (2) pp. 131-133; Bieling et al. Nature (2007) vol. 450 (7172) pp. 1100-1105 and Supplemental data. Nature (2007) vol. 450 (7172) pp. 1100-1105.</p>		
6	Regulation of protein function	Joyce Lebbink
<p><u>Chapters in Alberts:</u> Ch 3 pp 175-190, Ch 6 pp 393-396.</p> <p><u>Paper:</u> Ulrich and Walden, Nature Reviews Molecular Cell Biology 11, 479-489, 2010.</p>		

Summary of mandatory 2nd year Biomedical Science PhD course

Literature Discussion for PhD students

The literature course should ideally be taken in the second year of the PhD. The aim of this course is to broaden knowledge into diverse topics of current interest and to develop skills in critical reading, interpretation and presentation of information from scientific literature. We have organized this course covering six topics of interest. Please visit the PhD program website page <http://www.erasmusmc.nl/mgc/> to see what subjects you can choose from. Please e-mail the organizer of the specific literature topic of your interest that you want to participate (see website for e-mail contact). Bear in mind that each topic can hold minimally four and maximally eight students, places will be allotted on a first come first serve basis. Including the first session, where "the rules of the game" are explained, there will therefore be 5-9 literature sessions. Once the organizer knows how many students are participating he/she will contact them directly and arrange date, time and place for the sessions.

During the first session the instructor (organizer) presents an overview (ideally accompanied

by a review to have been read by the students before the meeting) of the topic. In addition some information on the motivation for the choice of articles and aims of the discussions could be presented as guidelines. The instructor also explains what is expected of the students, including how they will be evaluated. The students will then be assigned or choose an article to present. The following sessions consist of students presenting the papers and discussion. Students should present a "journal club" talk, with some background on why the article relates to the topic, an overview of the questions addressed, a thorough summary of the data and results, a discussion of the degree to which the data supports the conclusions and how the work relates to the topic of the course.

The organizer evaluates the students. If they have actively participated in the discussions and have done well the student earns 2 ECTS points.

Summary of mandatory 3rd year Biomedical Science PhD courses

Participation in Junior Science program

The Junior Science Program is looking for PhD students who are willing to guide high school students during a one-week practical in the lab.

What is the Junior Science Program?

The Junior Science Program aims to arouse the interest of high school students (5 and 6 VWO) for the life sciences. It provides the students with the opportunity to get to know the world of scientific research through hands-on experience in the lab, so that they can make an informed decision about a future career in one of the life sciences. At this moment students from 20 high schools in the region visit numerous labs in the Erasmus MC. Several other schools are on a waiting list and eager to join the program. For that, however, we need to increase the number of subjects.

What do you have to do?

We ask you to guide a team of two high school students, in approximately the 2nd/3rd year of your PhD Guidance will include explaining the background and aim of your research, planning a simple experiment that can be performed by the students, helping them with laboratory work and answering questions. Most students use the practical as basis for their "profielwerkstuk" (a written report, in the context of a VWO elective). You will also be asked to give feedback on this paper.

How much time will it take?

Since the students have only a limited background in biology and no background in laboratory research, the guiding will be intense. This means you will have to dedicate one week almost entirely to the students. Including the preparation and feedback we estimate the guidance to be approximately 40 hours.

Why should you do it?

In the first place because you like transferring your knowledge and more importantly your enthusiasm for scientific research to young people. They are the researchers of the future! Second, you will gain important experience in teaching. Finally, you will receive 1.5 credit points (ECTS) to be added to your PhD portfolio. In other words, the Junior Science program will look good on your PhD portfolio and CV.

Application

Applications or questions can be directed to Marjoleine van Berckel Bik (coordinator, telephone 44844, e-mail juniorscience@erasmusmc.nl). More information on the Junior Science Program can be found on www.erasmusmc.nl/juniorscience/.

Overview of optional courses

This is a flexible program that will change with the progress of science and will be expanded whenever desirable. The courses may last from 1 day up to 2 weeks and are held once a year or once every two years. There are no formal examinations, but students wishing to attend are obliged to be present in all classes ('aanwezigheidsplicht'). On top of the attendance of lectures and demonstrations, the courses may demand an amount of self study, such that the time needed per course will be exceeded. Details for each course are given in the appendix of the MGC Teaching programme booklet, which also includes a preliminary schedule, that may help in planning. The courses are also announced in the MGC-Bulletin, which appears 2 times per year, by posters, and on the MGC website <http://www.medgencentre.nl>. At present the following courses are planned:

Basic and translational Oncology

Genome Maintenance and Cancer

Signal Transduction and Control of Cellular Proliferation

Development, Stem Cells and Disease

Transgenesis and Gene Targeting

Analysis of microarray gene expression data

In vivo imaging: from Cell to Organism

SNP Course

Applied Bioinformatics: finding your way in biological information

Ensembl workshop

Epigenetic regulation

Technology Facilities

Next Generation Sequence data analysis

Other possibilities

Courses and workshops of third parties, for example the EMBL. The individual PhD student is encouraged to seek for himself appropriate opportunities. The following site may help: <http://www.etplatform.eu/>.

Visits to congresses.

It is strongly recommended that each PhD student visits one or more international congresses during his PhD study. The PhD student has to consult his supervisor as needed.

Important and/or handy web pages

Medical Faculty Leiden:

www.lumc.nl/home

MGC postgraduate school:

www.medgencentre.nl

PhD education in Rotterdam:

www.erasmusmc.nl/graduateschool/Phdeducation/?lang=en

Overview of courses:

www.erasmusmc.nl/mgc

Overview of ECTS points of the courses organized by MolMed postgraduate school:

<http://www.molmed.nl/images/Richtlijnen%20PhD%20traject%20MolMed%20Appendix%204.pdf>

Syllabi of CDB, Genetics, and BB courses:

http://www.erasmusmc.nl/medical_genetics/education/mgc/

'Teaching and coaching plan' form (OIO forms):

http://intranet.erasmusmc.nl/directie_personeel/voor-medewerkers/formulieren-overzicht/

'OIO-beoordeling' forms (6 and 9 months):

http://intranet.erasmusmc.nl/directie_personeel/voor-leidinggevendden/3033145/

PhD portfolio at Erasmus MC:

<http://intranet.erasmusmc.nl/onderzoeksbeleid/carriere/phdprogram/3651836/?lang=en>

Information on the participation in the Junior Science Program (Junior Science instructor):

http://www.erasmusmc.nl/medical_genetics/education/mgc/2799477/

Available PhD positions :

<http://www.erasmusmc.nl/werkenbij/vacatures/vacatures/?lang=en&functieSelect=Wetenschap+en+O%26O&locatie=All+locations&afd=All+departments&zoekVacature>