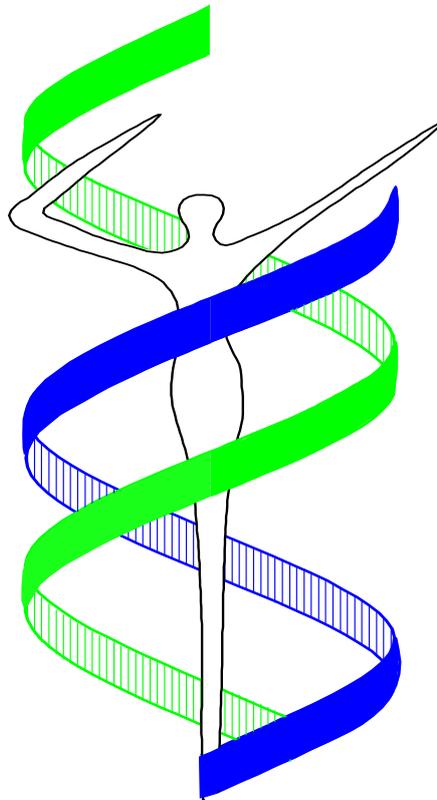Graduate School

MEDICAL GENETICS CENTRE SOUTH-WEST NETHERLANDS

MGC

Teaching programme

for PhD students

Edition 2016 - 2017

The Centre is an initiative of the Erasmus Medical Center and the Leiden University Medical Center

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3rd   edition September 1994
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9th   edition September 2000
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21th   edition September 2012
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23rd   edition September 2014
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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.

The Teaching Programme for PhD Students of the Medical Genetics Centre South West Netherlands

In October 1991, the Board of Directors of the MGC set up a committee with the specific task of proposing a teaching programme for PhD students. This booklet is the fruit of the efforts of this Committee and contains the programme as approved by the Board and as adapted later on. The members of the current Teaching Committee of the MGC are: Raymond Poot and Kerstin Wendt of the Erasmus MC and Dorien Peters, Harry Vrieling and Madeleine Nivard of the LUMC. The Committee will mainly concentrate on evaluating the course offerings and, where necessary, advise on setting up new courses. In this context, members of the MGC are cordially invited to contact the Committee for any comments regarding the course program. (Contact email address: *Nivard@lumc.nl*)

Background
A research project is the central component of the work of a PhD student making up the main part of his training. A broad education, in addition to the usually super specialized research programme, is of great value for both the MGC and the PhD student who will attain a better 'market value' and will, thus, have a better chance on the job market. Consequently, the teaching programme of each PhD student should cover as much as possible the whole field of Medical Genetics.

Teaching obligation
It is required that a PhD student spends his working hours on research ($\geq$ 60-80 %), assisting in the Institute's teaching programme ($\leq$ 20 %) and personal development (15%). PhD candidates are expected to frequently present their results in writing and by oral presentation at national and international meetings which also serves to expand their scientific network. Like attending courses for personal development also networking forms an important aspect of their training (see also the rules for PhD students as laid down by the Medical Faculties).

The package of courses for the individual PhD student contains obligatory courses including the ones demanded by the Medical Faculties in Leiden, Rotterdam and by the University of Leiden. Each of these organizations has a PhD program for their PhD students. These programs are embedded in the Graduate School MGC. The PhD students of the MGC are advised to carefully check the program of the organization they belong to and comply with the requirements.
For PhD students at the LUMC it is advised to visit the site:
https://www.lumc.nl/research/graduate-school/
For the Erasmus MC PhD students it is described in the document 'Teaching program of Biomedical Science' that can be found at the site:
http://www.erasmusmc.nl/biomedicalsciences/education/PhD/

Calculated in "working days" a PhD student will, on average, attend 30 days of "courses" a year. Approximately 20 of the 30 days will be taken up by the obligatory section, such as literature discussions, seminars and work discussions. This implies that an average of 10 days per year is available for optional courses (see 2 & 3) which is approximately equivalent to participation in 2 of the MGC courses each year. Some courses, for instance on safety, are obligatory in the first year. It is recommended that the teaching load be minimized in the fourth year as the PhD student will then have to concentrate on finishing his research and writing his thesis.

With respect to the course on statistics it seems sensible to maintain the present obligation to take this course, but the obligation can be waived when a PhD student has received a substantial training in this area as an undergraduate.

With regards to informatics, it is desirable that all PhD students learn how to handle computers for the retrieval and handling of information. However, part of these techniques will be taught within the optional courses. In consultation with promotor and supervisor the PhD student shall have to choose from the above whatever is useful to him.

The programme
Participation in the MGC teaching programme is mandatory for all PhD students within the MGC. The student is free to compile his own individual programme as far as it concerns the non-compulsory part. It is recommended that the choices, made in consultation with his supervisor/promotor, are presented in the first year to the PhD Teaching Programme Committee of the MGC. This personal teaching programme will be registered on a form. The PhD student will receive a certificate after a course has been followed. Formal checks by way of tests or examinations seem out of place. In due time ECTS points will be awarded to all MGC courses.

Participation by others
The courses will generally be open to PhD students and other interested persons from outside the MGC. In case of a limited number of places the order of preference will be: 1. MGC PhD students and other PhD students from the Medical Faculties of the Leiden University (UL) and the Erasmus University Rotterdam (EUR); 2. PhD students from other institutions; 3. Non-PhD students.

Costs
Participation in the courses is free for personnel of the MGC institutions. PhD students and others from other institutions will be charged an average of € 50 per day plus € 50 administration costs; people from outside the academic world will pay twice as much. For further information and conditions, please, refer to the description of the individual courses. For individual courses other rules may apply.

COACHING OF PHD STUDENTS
The MGC Board considers of great importance that the PhD students function optimally, and consequently, wants to ensure that their research projects come to fruition within the set time limits.
To reach this goal, formal coaching will take place alongside the direct supervision of the promotor and daily supervisor. Considerations taken into account are, that the coaching:
- must, in the first place, be directed towards the interests of the PhD student
- must be informal
- can contribute to the scientific content of the project
- can contribute in cases of relational problems

Nowadays also the graduate schools of the medical faculties of Leiden and Rotterdam have formulated in their teaching programs the way students should be accompanied during their PhD research
(https://www.lumc.nl/research/graduate-school/supervision-plan/ and
http://intranet.erasmusmc.nl/directie_personeel/voor-medewerkers/formulieren-overzicht/)

Teaching Programme for PhD students

Information on mandatory courses for ErasmusMC PhD students can be found at: http://www.erasmusmc.nl/biomedicalsciences/education/PhD/
Mandatory courses for LUMC PhD students can be found at: https://www.lumc.nl/research/graduate-school/courses/

1   **Mandatory for each MGC PhD student** (exemptions are possible in individual cases for 1.2-1.6)

1.1 **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 will be given twice a year, alternately in English and Dutch. The course will be given in collaboration with the Department VSM of the LUMC.
Apply through the MGC web site: www.medgencentre.nl or for LUMC members through the 'bedrijfsopleidingen' link on 'albinusnet'.

1.2 **Working with Test Animals (Proefdierkunde)**
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 (PDC-LUMC/Cursuspdk@lumc.nl) or the faculty in Rotterdam
(http://intranet.erasmusmc.nl/onderzoeksbeleid/carriere/phdprogram/coursesintra/animal/?lang=en&view=Standard).

1.3 **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://hum.leiden.edu/languagecentre/english/academic-english.html or in Rotterdam http://intranet.erasmusmc.nl/onderzoeksbeleid/carriere/phdprogram/coursesintra/english/?lang=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.

1.4 **Informatics**
It is essential that all PhD students learn to retrieve and handle information using a computer. Basic knowledge is needed for literature searching (e.g. Medline), word processing, graphical presentation of data (e.g. Powerpoint) and, possibly, database management (e.g. DBase). PhD students can take the short courses offered, for example, by the University Library or the faculty in Leiden http://www.library.leiden.edu/help/help/general-courses.html). Apply directly to these institutions for further information.
More special techniques are taught in the non-compulsory courses.

1.5 **Statistics**
Although many PhD students have already taken courses in statistics during their undergraduate studies, we consider a basic course on statistics important, since many research approaches in biomedical sciences rely heavily on statistics. The obligatory basic course on statistics for PhD students in the Erasmus MC lasts one week and is given in the spring. See (http://nihes.nl/courses/biostatistical-methods-i-basic-principles-part-a/). PhD students of the LUMC that were not educated in statistics can follow one of the existing courses organized by Boerhaave CME (see https://www.boerhaavenascholing.nl/pages/Boerhaave/Home?windowuid=uid5036063ecf19a)

1.6 **'Caput colleges & colloquia'**
These are activities within the own Institution. Pay attention to announcements and consult the supervisor.

1.7 **Work and literature discussions**
These are activities within the own Institution. For ErasmusMC PhD students the Literature course is compulsory.

1.8 **MGC Promovendi workshop**
PhD students of the MGC will present their work to each other followed by discussions. The format is a yearly four-day meeting outside town. The next workshop will take place in *spring 2017.* Further information will appear in the MGC-bulletin and on the website. Also, all PhD students will receive a personal invitation.

2   **Optional courses** offered by the graduate school MGC and/or MolMed.
This is a flexible programme 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, as mentioned below, will be exceeded. Details for each course are given in the appendixes I and II. Appendix III includes a preliminary schedule, that may help in planning.
The courses will be further announced in the MGC-Bulletin, which will appear 2 times per year, and on the websites of MGC http://www.medgencentre.nl/ and MolMed https://www.molmed.nl/

At present the following courses are planned for 2016-2017:

Organised by MGC

- Next Generation Sequence data analysis
- From Molecular pathogenesis to targeted therapy
- Technology facilities
- Genetic engineering in model organisms: technology and application in basic and medical research
- Workshop 'Share your biotechnology research with a broad audience'
- Functional imaging and Super Resolution
- Python programming
- Version control with Git
- Scripting for Life Science Researchers

Organised by MolMed (This is a selection of the total course package)

- Basic and translational oncology
- Analysis of microarray gene expression data
- SNP Course

3   **Other Possibilities**

3.1   Courses and workshops of third parties, for example the EMBL. The individual PhD student is encouraged to seek for himself appropriate opportunities.

3.2   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.

Appendix I

OPTIONAL COURSES OFFERED BY THE MGC

For participation apply through the MGC web site:

www.medgencentre.nl

Epigenetic regulation in health and disease

Organizers: *Dr. L. Daxinger (LUMC), Dr. R. Poot (Erasmus MC) and*

                  Dr. H. van Attikum (LUMC)

Dates: *Spring 2018*

Location: *LUMC, Leiden*

Duration: *2 days*

More information about the program and topics will be available soon on the website of the MGC (**www.medgencentre.nl**)

The course aims to introduce students to epigenetic mechanisms and technologies by providing an overview of the state-of-the-art of research on these subjects in The Netherlands. The course consists of lecture sessions in the morning and in the afternoon.
Some of the topics included are: genetic and epigenetic pathways in health and disease, genome-wide methylation profiling, transcription factors, chromatin remodelling, chromatin and the DNA damage response, X-inactivation, stem cells and epigenetics.

The course is free of charge for all personnel of MGC institutions. Participants from outside these organisations pay €200 for this course including lunch.

Genome Maintenance and Cancer

Contact person: *Dr. M.J.M. Nivard, phone 071-5269605; e-mail:nivard@lumc.nl*

Date: *March - April, 2018*

Location: *LUMC or Erasmus MC*

Duration: *2 days*

Preservation of genetic information (DNA) is of prime importance to all living systems. The aim of the course is to familiarize participants with the mechanisms that are involved in maintaining genome stability. In the environment humans are exposed to chemical agents and radiation, which threaten the integrity of the genetic material leading to risks for the induction of cancer and congenital malformation. To withstand the harmful effects of DNA damage and to maintain genome integrity, cells are equipped with an intricate network of DNA damage response pathways. Key players in these processes are protein complexes involved in DNA replication, DNA repair and chromosome segregation as well as regulators of the cell cycle and cell death.

This course will provide an up to date insight in the chain of reactions from exposure to the ultimate consequences. Lectures will deal with the basic principles of several cell biological aspects such as DNA damage formation, signalling pathways, DNA repair and mutation formation. A few lectures will deal with more applied research.

Content (preliminary):
- DNA replication associated mutagenesis
- Loss of heterozygosity and the importance for carcinogenesis
- DNA repair mechanisms and cancer susceptibility
- Human DNA repair syndromes
- UV-light and radiation induced cancer risk in human
- Oncogenes and senescence
- Cell cycle checkpoints, apoptosis
- Carcinogenesis studies with mice
- Functional screens to identify cancer relevant genes
- Application for drug discovery

There is a minimum of 14 and a maximum of 40 places.

The course is free for all members of the MGC institutes. Participants from outside these institutes pay € 200 for this course.

Next Generation Sequencing data analysis

Contact person: *Dr. J.F.J. Laros; email: j.f.j.laros@lumc.nl*

Session chairs: *J.T. den Dunnen, W.F.J. van IJcken, J.M. Boer, B.E. Dutilh and*

J.F.J. Laros,

Date: *29-31 August, 2016*

Location: *LUMC, Leiden*

Duration: *3 days*

This course aims at PhD students, postdocs and senior researchers who are interested in, planning, or already working with next-generation sequencing. We welcome researchers from both the genomics and bioinformatics fields. Currently available technologies as well as hardware solutions will be presented and discussed. The focus of the course will be on data and ways to analyse the data.

There is a maximum of 60 places.

PhD students from MGC and GSMS get a discount of 100% and pay €0. Participants on behalf of BioSB pay €175 fee. All other academic participants pay €250 fee. Commercial participants pay €500 fee.

From Molecular Pathogenesis to Targeted Therapy

Contact persons: Prof.dr. P. ten Dijke, dr. H. van Dam; email: vdam@lumc.nl

Date: 1-4 November 2016

Location: LUMC, Leiden

Duration: 4 days

Objectives

To give an overview on how cells communicate with each other, how (molecular) signals are transduced between cells and into cells, how these processes regulate cellular functions, how misregulated signal transduction events lead to diseases, and how insights in these processes can be translated into targeted therapies providing personalized and more effective treatments for patients with less side effects.

The course will involve state of the art lectures on signaling, molecular pathogenesis and targeted therapy by experts in the field.

program

day 1   Signaling pathways
day 2   Ageing, metabolic diseases and cancer
day 3   Inflammation, growth control, stem cells and cancer
day 4   Personalized medicine, targeted therapy and imaging

More information will follow through the MGC website.

The course is free for all members of the MGC institutes. Participants from outside these institutes pay € 250 for this course.

Technology Facilities

Contact person: *Dr. M.J.M. Nivard, phone 071-5269605; e-mail: nivard@lumc.nl*

Date: *January - February, 2017*

Location: *LUMC*

Duration: *4 days*

The course will deal with four topics:

1. **Day 1 - Genomics and Transcriptomics**
   Organizers: Dr. W. van IJcken, Erasmus MC, Rotterdam, and Dr. H.P.J. Buermans, and Prof. Dr. J. den Dunnen, LUMC, Leiden

2. **Day 2 - Proteomics**
   Organizers: Dr. J. Demmers, Erasmus MC, Rotterdam and Dr. P. Hensbergen, LUMC, Leiden

3. **Day 3 – Imaging (half day)**
   - Live cell imaging
   Organizer: Dr. G. van Cappellen and Prof. Dr. A. B. Houtsmuller, Erasmus MC, Rotterdam

4. **Day 4 – Metabolomics**
   Organizer: Prof. Dr. T. Hankemeier, Leiden Academic Centre for Research (LACDR) - division Toxicology, University Leiden

The course is meant for PhD students who just started their research or are not familiar with the different topics. One can subscribe also for individual days.

There is a minimum of 20 and a maximum of 40 places.

The course is free of charge for all personnel from MGC institutes. Participants from outside these institutes pay €250 for this course including lunches. Registration costs for a single day is €100 plus 50 euro for every other day.

Genetic engineering in model organisms: technology and application in basic and medical research

Contact person: *Dr. J.S. Verbeek , tel. 071-5269410*

Date: *12-14 June and 15-16 June,2017*

Location: *LUMC, Leiden*

Duration: *5 days (including 2 days int. workshop on Innovative Mouse Models)*

The ability to modify genes at the level of the germ line by transgenesis and gene targeting has been crucial for our understanding of gene function and has yielded many highly valuable models for human diseases.
This course will deal with the basic principles underlying the generation of transgenic, knock-out (KO) and knock-in (KI, *i.e.*, gene-modified rather than gene-inactivated) mice.
Transgenesis, when combined with the recently developed technology of whole-animal cellular and molecular imaging (*e.g.*, bioluminescence, MRI, multiphoton imaging), allows direct visual access to complex biological processes in their native environment, thus providing better insight into mammalian biology than ever before.
KO and KI mice were traditionally made through Embryonic stem cell (ESC) technology. ESC derivation, *in vitro* genetic modification and use in the generation of chimeric mice represent another main theme of the course.
Most recently, the spectacular advances in CRISPR/Cas9-assisted gene modification have found wide application in mouse genetics. CRISPR/Cas9-technology strongly facilitates gene targeting in ESCs, but can also directly be used in zygotes, evading the ESC route. Both applications will be presented, as well as the application of CRISPR/Cas9 technology in non-germ-line gene modification.

The course will consist of lectures covering technology and applications of genetic engineering in basic and medical research. Practical demonstrations will show crucial steps in the generation of transgenic, KO and KI mice, and principles of *in vivo* imaging.
The first three days of the course will prepare participants for the 2-day international workshop on Innovative Mouse Models (IMM 2017) immediately following the course. Keynote lectures from leading laboratories and presentations from selected abstracts will discuss the latest developments on advanced genome modification protocols and its applications in fundamental biology and biomedical research. **Course participants will participate in 'meet-the-expert' sessions.**
This introductory course is aimed at PhD students with little or no experience in the field of transgenesis and in vivo imaging, but is also of interest to those already working with animal models but wishing to expand their knowledge of the above technologies for applications in their own research.

Content:
-Conventional transgenesis including mouse genetics
-Gene targeting / replacement and conditional gene targeting, inducible gene expression
-CRISPR/Cas9-assisted gene modification
-Construct design including promoters and other regulators of gene transcription
-In vivo imaging
-Embryonic stem cell derivation via 2i culture
-Dedifferentiation via iPSCs
-Presentations on applications in cardiovascular disorders, cancer, immunology etc.

PhD students from outside the MGC institutions are charged a € 250 enrolment fee.

Share your research data with a broad audience
- workshop -

Contact person: *Dr. M.J.M. Nivard, phone 071-5269605; e-mail: nivard@lumc.nl*

Date: *15 and 29 November, 2016*

Location: *LUMC, Leiden*

Duration: *2 afternoons*

Science journalists Marianne Heselmans and Astrid Smit have developed a workshop to learn to:
- **Get to know and understand your reader or listener**
- **Discover your own appealing and exciting story**
- **Write up this story in a clear and attractive way**

A training course on: 'how to share your research data with a broad audience, like patients, clients, journalists or investors'. How do you go about this? What should you tell and how to make sure that the reader doesn't lose quickly interest after the first sentences.

In the workshop Marianne Heselmans and Astrid Smit – two experienced science journalists - provide you with tools to do this. They will teach you to understand the reader, to discover your own appealing story, to write this down in a clear way. The workshops are practical. You get started quickly, after a theoretical introduction. Smit and Heselmans prefer to work with your own texts. These may be blogs, websites, articles for specialist journals, posters, press releases or presentations. You work on an assignment between the two workshop sessions. For more information go to www.deperskamer.eu or send an email to nivard@lumc.nl.

There is a maximum of 12 and a minimum of 7 participants.

The course is free of charge for personnel from MGC institutes. Participants from outside these institutes pay €200 euro for this workshop.

Live Cell and Super Resolution Imaging

Contact person: *Dr. W.A. van Cappellen; email: w.vancappellen@erasmusmc.nl*

Date: *24-28 October 2016*

Location: *Erasmus MC, Rotterdam*

Duration: *5 days*

This five day course consists of lecture sessions in the morning and practical sessions in the afternoon. On Monday and Thursday there will also be evening sessions with a dinner. In the final session on Friday afternoon participants will present and discuss the results of their practical work. The practical sessions can be attended by a maximum of 24 participants (6 groups of 4 participants). When registering for the course you are expected to follow the complete (one week) course.

Topics: Time lapse, FRAP, FRET, super resolution, single molecule localization, PALM, STORM, GSDIM, Hyvolution, Airy scan, Rescan, Fluorescent proteins, quantitative data analysis.

More information and registration can be found on the OIC website http://www.erasmusmc.nl/oic

This is a combined course of the Medical Genetics Center South-West Netherlands (MGC) and the Erasmus Optical Imaging Centre

The course is free of charge for personnel from MGC, MolMed and ONWAR. Participants from outside these organisations pay €200 euro for this course. The lecture sessions can be attended for free.

Python programming course

Contact person: *Dr. J.F.J. Laros; email: j.f.j.laros@lumc.nl*

Date: *November/December 2016*

Location: *LUMC, Leiden*

Duration: *4 days*

This course is targeted at PhD students, postdocs or anyone willing to learn how to program in Python. Students are assumed to have some experience with programming, but not necessarily in Python, and the UNIX shell. There will be a focus on bioinformatics and programming to support scientific research in general.

The program consists of four mornings with lessons and some assignments to be done in your own time (i.e., during the afternoons).

The course is free of charge for MGC personnel.

Version control with Git

Contact person: *Dr. J.F.J. Laros; email: j.f.j.laros@lumc.nl*

Date: *Autumn 2016*

Location: *LUMC, Leiden*

Duration: *1 day*

This course aims at everyone who works in the Bioinformatics field. We cover a version control system named Git. This system is widely used by software developers, but can also be used for project management. By keeping track of all versions, history, etc. collaboration with colleagues is easy and your analysis will be reproducible.

The course is free of charge for MGC personnel.

Scripting for Life Science Researchers

Contact person: *Dr. J.F.J. Laros; email: j.f.j.laros@lumc.nl*

Date: *to be announced on the MGC website*

Location: *LUMC, Leiden*

Duration: *3 days*

This course is designed for researchers, including PhD students and postdocs, who frequently handle large datasets or large numbers of files (images, sequence reads, mass spectra etc.) and who needs a more efficient way of working with such data. The course is equally suitable for those working with Windows, Mac OS X or Linux. No prior knowledge of operating systems is needed, the course includes an optional introduction to Linux and an installation practical for Windows and Mac OS X users.

The goal of the course is to empower students and researchers with backgrounds in biology or biomedicine to navigate, manage and perform operations on files and data and metadata in tabular text formats. The data may be microscopy images, FASTA sequences, gene ontology files, chromatograms, mass spectra or tables with data on genes or proteins. The course is not a general introduction to programming and will not deal with XML data, Web services or more advanced topics. The course will be taught by J. Laros, M. Palmblad, T. Güler, R. Marissen, M. Vermaat and M. van Iterson.

We only have facilities to accommodate 16 participants. If more than 16 people register a selection will be made.

The course is free of charge for MGC personnel.

Appendix II

OPTIONAL COURSES OFFERED BY MolMed

For participation apply through the MolMed web site:

www.molmed.nl

Basic and translational Oncology

Contact person: *for more information see:* www.molmed.nl

Date: *10 – 14 October 2016*

Location: *Erasmus MC, Rotterdam*

The aim of the course is to provide **a comprehensive introduction to the field of translational cancer research.**

The course is directed primarily at PhD students and postdocs of the Postgraduate Schools MGC and MolMed, but other participants (e.g., students and technicians of LUMC and ErasmusMC) are welcome too. The maximum number of participants is 40.

Each day is dedicated to a specific **theme** relevant to cancer and is organized as follows:

 ➢   General introduction to the overall theme of the day
 ➢   Presentations on specific topics
 ➢   Technical talk, journal clubs or scientific debate

Every slot of a presentation includes Q & A time on the subject.

The program is set up logically in 5 steps, one step a day:

 ➢   **Pathology, diagnostics and pathways in cancer.**
 ➢   **Biology of the cancer cell: Genetics.**
 ➢   **Invasion, metastasis & inflammation**
 ➢   **Tumor Immunology; Clinical practice: targeted therapies.**
 ➢   **Epidemiology of cancer, personalized medicine;end-of-life interventions.**

This is a combined course of the Medical Genetics Center South-West Netherlands (MGC) and the Molecular Medicine – postgraduate school (MM).

For current course fees and discounts see the MolMed site.

Gene expression data analysis using R: How to make sense out of your RNA-Seq/microarray data

Organizer: Dr. Judith Boer (Erasmus MC, 010-7038264; email:
   j.m.boer@erasmusmc.nl

Planned date: end of June/beginning of July 2017

Location: Rotterdam

Duration: 5 days

The course is tailored for biological and clinical researchers whose research involves experiments that generate gene expression data by using RNA sequencing or microarrays. The course focuses mostly on the analysis of expression data, and explains general concepts such as experimental design; data processing and quality control; normalization; annotation; finding differential expression; clustering; classification; testing groups of genes, functional annotation and interpretation, networks. We do not explain the technologies themselves and we do not cover the mapping of sequence reads. Dedicated courses for next-generation sequencing and RNA-seq covering these topics are available (see www.biosb.nl). Some concepts may be applicable to other types of genomics data. Most of the speakers (and therefore examples) have a biomedical background. The course consists of 2.5 day theory and 2.5 day computer practicals. Programmes used in the practicals include R, DAVID, Anni, and Cytoscape. Previous experience with R and/or the "Introduction to R" course are required.

A maximum of 40 places are available. For more information and (pre)registration: www.molmed.nl. The course lectures and practicals are available for self-study at molmed-expression.erasmusmc.nl.

For current course fees and discounts see the MolMed site.

Overview of courses related to NGS expression data analysis

Two Dutch courses are related to biomedical RNAseq data analysis, but with a complementary focus and topics. Please use the table to identify the best course(s) for your needs.

Course/Topics	RNAseq advance data analysis LUMC, Erasmus MC & NBIC www.biosb.nl ~Oct/Nov	Gene expression data analysis using R: How to make sense out of your RNA-Seq/microarray data MolMed (Erasmus MC) www.molmed.nl ~June/July
Target audience	Genomics or bioinformatics researchers with RNAseq data	Genomics or bioinformatics researchers with RNAseq or microarray data
Prerequisites	Basic NGS course MGC (LUMC & NBIC) www.medgencentre.nl ~Sept	Basic R course MGC or MolMed or elsewhere ~June
Alignment and de novo assembly	++	-
Data visualization	++	-
eQTL analysis and allele specific expression	++	-
Variant calling and RNA editing	++	-
Small RNA profiling	++	-
RNAseq experimental approaches	++	+
Experimental design	+	++
Preprocessing and QC	++	++
Statistics for differential expression	++	++
Batch correction	-	++
Testing groups of genes	+	++
Hierarchical and K-means clustering	-	++
Classification	-	++
Power and sample size	-	+
Databases and pathway analysis	-	++

++ covered extensively; + covered; - not covered

SNP Course

Organizer: *For more information check the website* www.molmed.nl

Dates: *14 - 18 November 2016*

Location: *Erasmus MC, Josephine Nefkens Institute, Rotterdam*

Duration: *5 days*

The analysis of DNA variations, including Single Nucleotide Polymorphisms (SNPs), is a standard research approach to understand causes of disease, in particular the so-called "complex" diseases such as diabetes, osteoporosis, cancer, Alzheimer disease, etc. The field is changing fast with large scale projects (Human genome, dbSNP, HapMap, 1000genomes, ENCODE) and novel technology being continuously introduced, including Next Generation Sequencing.

The aim of this course is to give a broad introduction in SNP techniques and applications. The course is primarily organized for PhD students and postdocs of the Erasmus Postgraduate School Molecular Medicine, Nihes, MGC and other research schools. Other participants, e.g. students and technicians from other universities working in this field, are also welcome. The total number of participants is limited to 75.

It is recommended for the participants of the SNP course to have <u>basic knowledge</u> of the central molecular biological dogma's (such as DNA and gene structure, DNA encodes RNA encodes protein, etc.) and of basic genetic principles. Those who have not are advised to follow the course 'Genetics for Dummies', also organised by MolMed, or the NIHES-ESP 57 course in the Erasmus Summer Program.

All participants will be requested to send a short presentation or description of their own research and field of interest in advance to the course organisation (email to: molmed@erasmusmc.nl). In this way we get to know your research topics, to better prepare the topics of the course. *All participants are expected to prepare some overhead sheets. A selection of the candidates will be asked to present their own research topics on Tuesday. The program also contains "learning-by-doing" sessions ("practicals") on the bio-informatic and statistical analysis in this field.*

For current course fees and discounts see the MolMed site.

Preliminary Schedule of optional Courses for PhD students for the years 2016-2020:

Title	2016	2017	2018	2019	2020
Safe Laboratory Techniques (Risicobeheersing in Laboratoria)	June December	June December	June December	June December	June December
AIO workshop	14-17 June	Spring	Spring	Spring	Spring
Epigenetic regulation in health and disease	2-3 May		Spring		Spring
Genome Maintenance and Cancer	21-22 March		Spring		Spring
Next Generation Sequence data analysis	29-31 August	Autumn	Autumn	Autumn	Autumn
From Molecular Pathogenesis to targeted therapy	1-4 November		Autumn		Autumn
Technology Facilities	18-21 January	February	February	February	February
Genetic engineering in model organisms: technology and application in basic and medical research		12-16 June		Spring	
Share your biotechnology research with a broad audience	15 + 29 November	Autumn	Autumn	Autumn	Autumn
Live cell and super resolution imaging	24-28 October	Autumn	Autumn	Autumn	Autumn
Python programming course	Nov/Dec	t.b.a	t.b.a.	t.b.a.	t.b.a.
Version control with Git	Autumn	Autumn	Autumn	Autumn	Autumn
Scripting for Life Science Researchers	t.b.a.	t.b.a.	t.b.a.	t.b.a.	t.b.a.
Basic and translational Oncology ⊿	10-14 October	Autumn	Autumn	Autumn	Autumn
Gene expression data analysis using R: How to make sense out of your RNA-Seq/microarray data ⊿	4-8 July	June/July	June/July	June/July	June/July
SNP Course⊿	14-18 November	Autumn	Autumn	Autumn	Autumn

⊿ In collaboration with Graduate School Molecular Medicine.