

FNWI-Fac. of Medicine BIOMEDICAL SCIENCES SILS-AMC

MASTER COURSE

MEDICAL BIOCHEMISTRY

AND

**MOLECULAR SYSTEMS
BIOLOGY**

BMS005-2009

-Part of the master program BMS/MEDICAL BIOCHEMISTRY Coordinated by Prof. Dr. S. (Stanley) Brul and Prof. Dr. J.M.F.G. (Hans) Aerts.

-Course coordinator: Prof. Dr. Stanley Brul Molecular Biology, Faculty of Science, Roeterseiland room C717B brul@science.uva.nl 020-5256970 / 7079.

-AMC coordinator: Dr. Rolf Boot Department of Medical Biochemistry AMC K1---- r.g.boot@amc.uva.nl 020-5665157.

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1. Introduction

Medical Biochemistry means the chemistry of life in health and disease. In the course “Medical Biochemistry and Molecular Biology”, the teachers will introduce you to a thorough understanding of how molecules take care of all the important chemical and cellular processes that occur during health and disease. The recurrent theme is integration: genetic, signal transduction and metabolic reactions form an integrated complex network of interactions that is at constant steady state (homeostasis) with its environment. Alterations like mutations and polymorphisms in single molecules not only affect single chemical processes but also cellular behavior and can have a severe impact on the proper functioning of complete organs and the organism itself. Furthermore, environmental factors like toxins and lifestyle can disturb the behavior of otherwise normal molecules thereby disrupting complete systems. Thus, studying biochemistry nowadays extends from genetics to genomics, proteomics and gene and protein networks, to metabolic networks of lipids, carbohydrates and proteins, to cellular communication and signaling cascades all the way to complex disorders of organs and the cardiovascular circulation. The research tools used in modern biochemical research similarly span a wide range of techniques from genome-wide micro-arrays to metabolic profiling, to mass spectrometry of peptides, proteins and other bio-molecules. In most cases these studies are no longer performed in the test tube, but in complete cells, tissues or organisms, using genetic approaches like viral transductions, RNA-interference and knock-out or transgenic mice. Therefore, we have chosen a format for this course, in which you will cover all the major issues in medical biochemistry both at the textbook level, and at the forefront of biomedical research in a clinical setting. What we hope to accomplish is not for you to memorize detailed knowledge or books by heart, but to come to an integrated insight and understanding of the molecular basis of metabolism and disease processes, which will guide you through the multidisciplinary way in which modern day medical biochemical research is performed.

2. Format of the course

This course forms part of the Masters in Biomedical Sciences, and is compulsory for the program in Medical Biochemistry, but also suited for the other programs in Medical Biology. As most of your Masters study is filled with experimental research work and theoretical background of the specific area you are working in, we have chosen a specific

format for this course. It is purely theoretical, to give you both an overview of the extensive research fields of molecular biology and medical Biochemistry, while at the same time supplying a firm understanding of the important basic concepts in these fields and how they directly relate to both state-of-the-art research topics and medical practice. To that end the course is based on two integral, similarly formatted parts, each hosted by one of the contributing Departments and is based on two of the most landmark textbooks on these subjects. The first part of the course is based at the Swammerdam Institute for Life Sciences (SILS) of the Science faculty (FNWI-UvA), hosted by the Department of Molecular Biology and Microbial Food Safety. There are generally morning lectures that will cover the basic concepts of Molecular biology by treating selected chapters from “Molecular Biology of the cell” by Alberts et al. 4th edition (5th available) in the first week followed by specific research topics in the 2nd and 3rd week. **In the afternoons of these first 3 weeks students will work mostly unsupervised on molecular biological problems of relevance to health and disease generally in the field of (prevention of) infection.** The topics will be handed to them in the form of literature supported cases that are discussed by the relevant lecturer at the end of the day of their first introduction. There are in principle 6 topics and 6 groups. The literature has to be studied and the results of the studies, which are to be performed at least in pairs, will be summarized and presented in the form of a written research proposal and a power point presentation. Each of the six groups presents one of the six topics orally. At the presentation the other groups actively engage in discussion of what is presented. This form of training is preparatory for the second part of the course. The fourth week is for self study to prepare for the first part of the examination by the end of that week.

The second part of the course is based at the Academic Medical Center (Medical Faculty-UvA), hosted by the Department of Medical Biochemistry. There, morning lectures will cover the basics of Medical Biochemistry from the view point of clinical correlations to the basic concepts of “Biochemistry” by Berg et al.. In the afternoons of these second 3 weeks the students will work unsupervised on specific assignments related to these clinical subjects, focusing on cutting edge research topics. At the end of each day, these will be the subjects of student discussion groups, which are lead by appointed students, with staff members merely acting as coach. Finally, a complex integrated metabolic disease will be studied from all the angles treated in the preceding weeks, summarized and presented by the students at the end of this period. The last week is for self-study and the second half of the final examination. The final figure is composed as described in section 5.

3. Part 1: Molecular Systems Biology

3.1 Introduction

The first 4 weeks of the course are spent at the Swammerdam Institute of Life Sciences (SILS) of the Science Faculty (FNWI) of the University of Amsterdam. The location will be the Roeterseiland Complex.

The mornings of the first 3 weeks at the FNWI faculty are filled with lectures, based on the textbook *Molecular Biology of the Cell* by Alberts et al., dealing with the most crucial basic knowledge on molecular cell biology and proteomics. We will discuss how many of these concepts are now used to be able to perform Systems Biology research. Amsterdam is one of the frontrunners see: <http://www.sysbio.nl>. Two guest lectures by researchers from the University Eindhoven will show how strong links between engineers and biologists currently shape this rapidly growing field.

In the afternoons the students have time to work in groups on Food & Health related problems with a Biochemical and Molecular Biological background. A total of six case studies will be worked on. Each group will summarize and work on (i.e. present further research needs) all of these for themselves. **In the afternoons of the day when the assignment is handed out there is time for discussion and questions with the respective lecturer. The lecturer will briefly introduce the topic.** In presenting this, students must follow the outline of a research paper, and use in addition to the start reference the available recent (0-3 years) data in peer reviewed scientific journals. Students can use the Internet connections available in the new documentation centre (library) of the Science Faculty in the B-building at REC or in the adjacent centers in the A-building at REC. At the end of the first part of the course the material all written summaries / proposals will be handed in on the Friday morning of the 3rd week and each pair will present one of them orally (all different ones) followed by a brief discussion in the afternoon. A final figure for this part of the course (25 % of final mark) is composed of 75% for summaries and 25% for the presentation and discussion. Next the material taught in the first part of the course will be examined on the Friday of the 4th week. This examination figure composes 25% of the final mark for the course.

3.2 Lecture program

Week1 Fundamentals of Molecular Cell Biology and Infection (prevention)

Mon 2 February (Brul, Boot) REC P 0.16

Morning 9:00-9:30

Course introduction

Morning 9:30-12:00 (Brul)

Membrane Structure, Transport & Uptake of Small Molecules

Reading: Chapter 10,11 Alberts

Afternoon: Self-Study REC JK 3.88/A available

Tue 3 February REC C.302

Morning 9:30(**ALWAYS SHARP!**)-12:00 (Brul)

Intracellular Compartments including Protein Sorting & Vesicular Traffic

Reading: Chapter 12,13 Alberts

Afternoon: Self-Study REC JK 3.85 available

Wed 4 February REC C.203

Morning 9:30 -12:00 (Brul)

Protein Structure & Energy Conversion

Reading: Chapter 14 Alberts

Afternoon: Self-Study REC B 3.41 available; from

16:00-17:00 Discussion / Questions assignment 1 with lecturer.

Assignment 1 How can a molecular (systems) understanding of bacterial spore germination provide options for new food preservation strategies?

See for start literature the papers on Blackboard under Assignments / folder Readers Brul/ Reader Brul2

Thu 5 February REC D 0.28

Morning 9:30-12:00 (Brul)

Cellular Signaling Networks & Principles of Systems Biology

Reading: Chapter 15 Alberts

Afternoon: Self-Study REC B 3.41 available

Fri 6 February REC JK 3.88/A

Morning 9:30-12:00 (de Koster)

Proteomics analyses; basics

Reading to be announced

Chapters Alberts and dedicated papers; see blackboard

Afternoon: Self-Study REC P 0.19 available

Week 2 Modelsystems, Modelling and Systems Biology

Mo 9 February REC P 0.16

Morning 9:30(ALWAYS SHARP!)-12:00 (ter Kuile Food Safety Authority & SILS)

A laboratory model to study bacterial antibiotic resistance development.

Reading to be announced+Chapters Alberts and dedicated papers; see blackboard

**Afternoon Self-Study REC JK 3.88/A available; from
16:00-17:00 Discussion / Questions assignment 2 with lecturer.**

Assignment2 How can mechanistic insight can be used in preventing unwanted occurrence of antibiotic resistance in foodborne microbes.

Tue 10 February REC C 3.02

Morning 9:30-12:00 (Van der Spek)

Model Systems in Molecular Biology; effects & side-effects of HIV therapy

Reading to be announced + Chapters Alberts and dedicated papers; see blackboard

**Afternoon Self-Study REC JK 3.85 available; from
16:00-17:00 Discussion / Questions assignment 3 with lecturer.**

Assignment 3 Motivate whether Systems Biology will be of use to study mt. function and dysfunction in *C. elegans* (be critical and use the information from Thursday & Friday this week).

We 11 February REC C 2.03

Morning 9:30-12:00 (W. Crielaard ACTA)

Host-microbe interaction 1; Oral Biofilms and Ageing in Man

Reading to be announced + Chapters Alberts and dedicated papers; see blackboard

**Afternoon Self-Study REC B 3.41 available; from
16:00-17:00 Discussion / Questions assignment 4 with lecturer.**

Assignment 4 Is there a role for ‘Systems’ approaches to study the ecology of multispecies biofilms? Be critical and motivate why yes or no use the information from Thursday & Friday.

Thu 12 February REC D 0.28

Morning 9:30-12:00 (Van Riel & Jeneson TU Eindhoven)

Physiological Modelling; mechanism based models and model based experiments 1

Reading van Riel N.A.W. Briefings in BioInformatics 7 364-374.

Chapters and dedicated papers available on Blackboard

See also <http://www.bmi2.bmt.tue.nl/Biomedinf/People/Riel/Education/IFP.htm> at TUE

Afternoon Self-Study REC B 3.41 available

Fri 13 February REC JK 3.88/A

Morning 9:30-12:00 (Van Riel & Jeneson TU Eindhoven)

Physiological Modelling; mechanism based models and model based experiments 2
Reading van Riel N.A.W. Briefings in BioInformatics 7 364-374.
Chapters and dedicated papers available on Blackboard
See also <http://www.bmi2.bmt.tue.nl/Biomedinf/People/Riel/Education/IFP.htm> at TUE
Afternoon Self-Study REC P 0.19 available

Week 3 Proteomics; Basics, application in cell biology and the clinic

Mo 16 February REC P 0.16
Morning 9:30-12:00 (van der Sar)
Zebra-fish as a model system to study microbial infections
Reading: to be announced + Chapters Alberts and dedicated papers; see blackboard
Afternoon Self-Study REC JK 3.88/A available

Tue 17 February REC C.3.02
Morning 9:30-12:00 (Klis)
host-microbe interaction 2
The cell wall proteome of Candida albicans in focus: functions and applications
Reading to be announced + Chapters Alberts and dedicated papers; see blackboard
**Afternoon Self-Study REC JK 3.85 available; from
16:00-17:00 Discussion / Questions assignment 5 with lecturer.**

Assignment 5 How can fungal wall proteomics combined with analysis in model systems help us to develop new vaccines, new therapeutic agents and lead to improved diagnostics?

We 18 February REC C 2.03
Morning 9:30-12:00 (Speijer)
Proteomics; a clinical Case Study
Reading to be announced + Chapters Alberts and dedicated papers; see blackboard
**Afternoon Self-Study REC B 3.41 available; from
16:00-17:00 Discussion / Questions assignment 6 with lecturer.**

Assignment 6 Proteomics to search for biomarkers in the Clinic; a case study.

Thu 19 February REC
Preparation written research proposals and presentations (all day Self-Study)
9:00-12:00 D 0.28 13:00-17:00 B 3.41 available

Fri 20 February Morning until 12:00 Self-Study (REC JK 3.88/A available) + hand-in written proposals to the instructors with cc to s.brul@uva.nl **This may be done at the latest by the end of week 4!**

Afternoon 13:00-17:00 (all instructors) REC P 0.19 Group Presentations & Drinks

Week 4 prepare for the examination of part 1 (see item 5)

Friday 27 February Morning 9:00-12:00 Examination part 1

REC A 3.03

4. Part 2: Medical Biochemistry

4.1 Introduction

The next 3 weeks are spent at the Academic Medical Center (AMC), which integrates the academic hospital and the Medical Faculty of the University of Amsterdam.

Morning sessions (9:00-12:00) are spent in the designated classroom on the relation of textbook knowledge with real-life clinical issues and medical biochemical research. Integrated medical biochemical issues (“clinical applications”) will be presented as introduction to the textbook *Biochemistry* (Berg et al.). First 2 sessions are lectures, whereas during the third session a student assignment will be introduced.

The afternoons are spent on self-study and the assignment. During this period the lecture room (AMC K1-253) at the Medical Biochemistry department, equipped with 4 fast internet computers, is available for use by the students. Further student computers can be found at the Digitorium, next to the Medical Library of the AMC (K0-ground level).

At the end of the afternoon (16:00-17:00), the assignment is presented by 1 or 2 of the students and discussed plenary by the students, supervised by the teacher.

During these sessions, all medical, metabolic, enzymatic, gene regulation and signal transduction topics are covered, which will integrate into the final assignment: treating a complex metabolic disease from all angles. This will be performed by 3-4 student groups that will present their assessment at the end of the 3-rd week. The various assignments at AMC will comprise 25 % of the final mark for the course.

After that the 8th week of the course (= the 4th week at AMC) on the Friday there will be a final examination of the theoretical material taught at the AMC. The exam figure for the examination composes 25% of the final mark for the course.

4.2 Lecture program

Week 5: Inherited & acquired disorders of metabolism

Morning sessions 9:00-12:00

Monday March 2 (Groen)	HvA A2.24
<i>Introduction enzymes, integrated metabolic networks and metabolite fluxes</i>	
Background reading: Berg Ch 14+30 (8,9,10)	
Discussion 16:00-17:00	HvA A1.07
Tuesday March 3 (Hochstenbach)	AMC K01-122
<i>Clinical Yeasts and therapeutic enzyme inhibitors</i>	
Background reading: Berg Ch 8+9+11 Alberts Ch 25	
Discussion 16:00-17:00	HvA A1.07
Wednesday March 4 (Poorthuis/Groener)	HvA A2.24
<i>Lysosomal storage diseases and ERT/SDT</i>	
Background reading: Berg Ch11, pg 312-319; Ch12 pg 345-347; Ch26 pg 736-739 & 745-747 Alberts et al: Ch13; Ch19 pg 1090-1098	
Discussion 16:00-17:00	HvA A1.07
Thursday March 5 (Waterham/Wanders)	HvA A2.24
<i>Clinical Metabolomics: diagnosing monogenetic disorders based on metabolic profiles</i>	
Background reading: Berg Ch 21+22+23+26	
Discussion 16:00-17:00	HvA A1.07
Friday March 6 (Speijer/Distel)	HvA A2.24
<i>Mitochondrial disease and peroxisomal import disorders</i>	
Background reading: Berg Ch 17+18+22 ; Alberts Ch 12+14	
Discussion 16:00-17:00	HvA A2.24

Week 6 Acquired disorders of metabolism, liver and vasculature

Morning sessions 9:00-12:00

Monday March 9: (Groen/Kuivenhoven)

HvA A1.09

Liver and lipoprotein metabolism, Gene therapy for metabolic disorders

Background reading: Berg: Ch 10+11+15+22+26

Discussion 14:00-15:00

HvA A2.24

Tuesday March 10: (Oude Elferink)

HvA A2.24

Hepatic drug detoxification: "Was Milosevic killed by rifampicin"

Background reading: Berg: Ch 10+11+13+15+22+26

Discussion 16:00-17:00

HvA A2.24

Wednesday March 11: (deVries/deWaard)

HvA A2.24

Atherothrombosis-I: Vascular dysfunction, signalling, growth, apoptosis, contractility

Background reading: Berg: Ch11+15+22+23+24+26 Alberts Ch15+16+17+19

Discussion 16:00-17:00

HvA A2.24

Thursday March 12: (Meijers)

HvA A2.24

Atherothrombosis-II: coagulation and thrombosis

Background reading: Berg: Ch 8+9+10

Discussion 16:00-17:00

HvA A2.24

Friday March 13: (Zwinderman)

HvA A1.09

Clinical Epidemiology and biostatistics of the Metabolic Syndrome

Discussion 16:00-17:00

HvA A2.24

Week 7: Inherited disorders of metabolism & Systemic biochemical disorders

Morning sessions 9:00-12:00

Monday March 16: AMC (Boot)

HvA A2.24

Liver and Integrated metabolism, Diabetes mellitus, Obesity and starvation

Background reading: Berg Ch 14+30 (excerpts from 10+15+20+22+23) Alberts: Ch 13

Discussion 15:00-16:00

AMC K01-123

16:00-17:00

AMC K01-123

Introduction to the final assignment "The Metabolic syndrome"

Tuesday March 17:

Selfstudy related to the metabolic syndrome.

Wednesday March 18:

Selfstudy related to the metabolic syndrome.

Friday March 20:

13:00-18:00 Student-symposium:

HvA A2.24

The Metabolic Syndrome: cellular, organ and vascular defects

+ Key note lecture by Prof. Dr. Hans Aerts

+ DRINKS with all teachers (Evaluation of the full course)

Week 8 prepare for the examination of part 2 (see item 5)

Friday 27 March Morning or Afternoon Examination part 2

AMC K01-122

5.0 Examination

Both part of the theoretical examination (after 4 and 8 weeks respectively) are OPEN BOOK EXAMINATION

The preceding days of those weeks are reserved for self-study from the study books (Molecular biology of the cell, Alberts et al.; and Biochemistry, Berg et al.) in the framework of the lectures and assignments you have been required to attend during the course. You are encouraged to understand and interpret the contents of these books and know their basic outlines, not to memorize them in detail. Therefore the format of the “open book exam” will be in both cases two open, essay questions, which you are to answer with thorough use of the study books. You are therefore required to bring both study books to the exam room, as you will need them to answer the integrated questions. Next, you will write short essays on the mentioned subjects according to the format trained during the various assignments at FNWI and AMC.

The final mark for the course will be composed of 25% REC assignment, 25% AMC assignment and 25% examination part 1 (after 4 weeks FNWI theoretical part) and 25% examination part 2 (after 8 weeks AMC theoretical part).

6.0 Required reading

Books: *Molecular Biology of the Cell* Alberts et al (4-th ed, pub: Garland); 5th edition available. *Biochemistry* Berg, Tymoczko and Stryer (5-th ed, pub: Freeman)

6.1 Entrance level

The entrance level of the MSc course will be equivalent to the exam level of the UvA Bachelors: i.e. thorough knowledge of Chapter 1-9 from MBC (Alberts). Self-study before the start of the MSc course is explicitly recommended.

6.2 Molecular Biology of the Cell (Alberts et al 4th Ed)

CH10	Membrane Structure
CH11	Membr. transp. small mol. and the electric. prop. of membranes
CH12	Intracellular Compartments and Protein Sorting: Mitochondria and peroxisomes, Endoplasmic Reticulum
CH13	Intracellular vesicular traffic
CH14	Energy Conversion Mitochondria and Chloroplasts
CH15	Cell communication
CH16	Cytoskeleton and muscle
CH17	Cell Cycle & Programmed Cell Death
CH19	Cell junctions and cell adhesion
CH21	Development of Multicellular Organisms
CH23	Cancer
CH25	Pathogens, Infection, and Innate Immunity

Chapters 16-25 will not be taught but do contain useful examples i.e. recommended reading.

6.3 Biochemistry: Berg, Tymoczko and Stryer 5-th edition

CH8 189-221 Enzymes and kinetics CH9 227-238 Catalytic strategies CH10 261-289 Regulatory strategies enzymes CH11 306-314 Carbohydrates CH13 345-363 Membrane channels and pumps CH14 373-391 Metabolism: basic concepts CH15 395-419 Signal transduction pathways CH16 443-460 Glycolysis and gluconeogenesis CH17 480-484 Citric acid cycle intermediates CH20 563-572 Pentose phosphate pathway CH21 577-595 Glycogen metabolism CH22 601-626 Fatty acid metabolism CH23 633-648 Protein turnover and amino acid catabolism CH26 722-738 Biosynthesis of membrane lipids and steroids CH30 845-861 Integration of metabolism CH31 874-888 Control of gene expression (Tamoxifen. SERMS) Clinical Applications (Berg, paragraph):

Inborn errors

lactose intolerance (16.1.12)galactosemia (16.1.13)mitochondrial disease (18.6.5)G6P dehydrogenase (20.5.2)glycogen-storage diseases (21.5.4)Zellweger syndrome (22.3.4)inborn errors amino acid degradation (23.6)Tay-Sachs (26.16)

Obesity and diabetes, Liver disease

diabetic ketosis (22.3.6)fatty acid synthesis inhibitors (22.4.9)prolonged starvation (30.3.1)diabetes (30.3.2)regulating body weight (30.3.3)Ethanol (30.5)isozymes and tissue damage (10.3)protein kinase inhibitors (15.5.1)liver disease (22.1.1)Urea cycle (23.4.4)

Atherothrombosis

blood clotting vitamins (8.6.2)protease inhibitors (9.1.7)thrombosis prevention (10.5.7)regulation of blood clotting (10.5.9)hemophilia (10.5.8)selectins and inflammatory response (11.4.1)aspirin and signalling (22.6.2)homocysteine (24.2.9)blood cholesterol (26.3.2)hypercholesterolemia and atherosclerosis (26.3.5)clinical management cholesterol (26.3.6)steroid hormone receptors (31.3.3)

7.0 List of teachers and affiliations

Swammerdam Institute of Life Sciences

Department Molecular Biology

Prof. Dr. Stanley Brul (*Chair Molecular Biology and Microbial Food Safety*)

Dr. Hans van der Spek (*Caenorhabditis elegans as modelsystem to study drug toxicity*)

Dr. Frans Klis (*Candida albicans and infection; the cell wall in focus*)

Department Mass spectrometry of Biomacromolecules

Prof. Dr. Chris de Koster

Guest lectures:

ATCA-Dental Faculty

Prof. Dr. W. Crielaard (*Oral Biofilms and Healthy Ageing*)

Department of Biomedical Engineering TU-Eindhoven Program Bioregulation & Systems Biology

Dr. Natal van Riels (*Modelling*)

&

Dr. Jeroen Jeneson (*Physiology*)

Dept. Medical Microbiology

VUmc Vrije Universiteit Medical Center

Dr. Astrid van der Sar (*Medical Microbiology*)

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Academic Medical Center -UvA

Department of Medical Biochemistry

ODP Glycosphingolipids in health and disease

Prof. Dr. Hans Aerts, Dr. Bert Groen, Dr. Rolf Boot (AMC Course Coordinator), Dr. Ans Groener, Dr. Ben Poorthuis, Dr. Boris Bleijlevens

ODP Molecular Cardiology (Atherosclerosis)

Prof. Dr. Carlie de Vries

Dr. Vivian de Waard

ODP Functional genomics of eukaryotes

Dr. Ben Distel, Dr. Frans Hochstenbach

Clinical Proteomics Facility

Dr. Dave Speijer

AMC Liver Center

ODP Experimental Hepatology

Prof. Dr. Ronald Oude Elferink, Dr. Piter Bosma

Department Experimental Vascular Medicine

ODP Haemostasis and thrombosis

Dr. Joost Meijers

ODP Premature Atherosclerosis

Dr. Jan-Albert Kuivenhoven

Department Genetic Metabolic Diseases

ODP Inherited Metabolic Diseases

Prof. Dr. Ronald Wanders, Dr. Hans Waterham

Department Clinical Epidemiology and Biostatistics

ODP Clinical Epidemiology and Biostatistics

Prof. Dr. Koos Zwinderman

8. Program and locations at a glance

Mastercourse Medical Biochemistry and Molecular Biology (BMS 005)

-Coordinator: Prof. Dr. Stanley Brul, REC C717B, dept Molecular Biology
And Microbial Food Safety, Science Faculty, 5256970 s.brul@uva.nl

-AMC-coordinator: Dr. Rolf Boot , AMC K1, dept. Medical Biochemistry
Tel 020-5665157, e-mail r.g.boot@amc.uva.nl

Locations SILS/REC: Roeterseilandcomplex, Roeterstraat (metro: Weesperplein)

Locations AMC: Academic Medical Center, Meibergdreef 15 (metro: Holendrecht)

Date	Lectures	Selfstudy and assignments
<u>Week 1: Fundamentals of Molecular Biology, Cell Biology and Communication</u>		
Monday	Feb. 2: 9:00-12:00 REC P 0.16	---Selfstudy-JK 388/A---
Tuesday	Feb. 3: 9:30-12:00 REC C 3.02	---Selfstudy-JK 385-----
	NB: 9:30 SHARP!	
Wednesday	Feb. 4: 9:30-12:00 REC C 2.03	---Selfstudy&16-17 hr.Disc.B 3.41
Thursday	Feb. 5: 9:30-12:00 REC D 0.28	---Selfstudy-B 3.41----
Friday	Feb. 6: 9:30-12:00 REC JK3.88/A	---Selfstudy-P 0.19-----

Date	Lectures/introduction	Selfstudy and lectures
<u>Week 2: Modelsystems, Modelling and Systems Biology</u>		
Monday	Feb. 9 : 9:30-12:00 REC P 0.16	Selfstudy&16-17hr.Disc.JK3.88/A
Tuesday	Feb. 10: 9:30-12:00 REC C 3.02	Selfstudy&16-17hr.Disc.JK 3.85--
Wednesday	Feb. 11: 9:30-12:00 REC C 2.03	Selfstudy& 16-17hr.Disc.B 3.41---
Thursday	Feb. 12: 9:30-12:00 REC D.0.28	---Selfstudy- B 3.41--
Friday	Feb. 13: 9:30-12:00 REC JK.388/A	---Selfstudy- P 0.19--

Week 3: Proteomics and applications in a clinical setting:

Monday	Feb. 16: 9:30-12:00 REC P 0.16	---Selfstudy- JK 3.88/A-
Tuesday	Feb. 17: 9:30-12:00 REC C 3.02	Selfstudy&16-17hr.Disc.JK 3.85--
Wednesday	Feb. 18: 9:30-12:00 REC C.2.03	Selfstudy&16-17hr.Disc. B 3.41---
Thursday	Feb. 19: -----Preparation essays & presentations----- 9:00-12:00 REC D 0.28-----13:00-17:00-B 3.41---available	
Friday	Feb. 20: Preparation essays JK 3.88/A	13:00-17:00 Symposium P 0.19-- +DRINKS

Week 4: Examination part FNWI (Selfstudy)

Friday	Feb. 27: 9:00-12:00 REC	REC A 3.03
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Week 5: Inherited & acquired disorders of metabolism

Monday March 2:	9:00-12:00 HvA A2.24	16:00-17:00: HvA A.107
Tuesday March 3:	9:00-12:00 AMC K01-122	16:00-17:00: HvA A.107
Wednesday March 4:	9:00-12:00 HvA A 2.24	16:00-17:00: HvA A.107
Thursday March 5:	9:00-12:00 HvA A.2.24	16:00-17:00: HvA A 1.07
Friday March 6:	9:00-12:00 HvA A.2.24	16:00-17:00: HvA A 2.24

Week 6: Acquired disorders of metabolism, liver and vasculature

Monday March 9:	9:00-12:00 HvA A1.09	14:00-15:00: HvA A2.24
Tuesday March 10:	9:00-12:00 HvA A2.24	16:00-17:00: HvA A2.24
Wednesday March 11 :	9:00-12:00 HvA A2.24	16:00-17:00: HvA A2.24
Thursday March 12:	9:00-12:00 HvA A2.24	16:00-17:00: HvA A2.24
Friday March 13:	9:00-12:00 HvA A1.09	16:00-17:00: HvA A2.24

Week 7: Systemic biochemical disorders

Monday March 16:	9:00-12:00 HvA A 2.24 Introduction assignment	15:00-16:00: AMC K01-123 16:00-17:00: AMC K01-123
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Tuesday March 17:	Selfstudy	
Wednesday March 18:	Selfstudy	
Thursday March 19:	Selfstudy	
Friday March 20:	Selfstudy & symposium DRINKS	13:00-18:00: HvA A2.24

Week 8: Examination part AMC

Friday March 27:	13:00-16:00	AMC K01-122
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