BASIC AND MOLECULAR GENETICS

Course code:	3MB035, 5MO104
Time:	2021-11-02 – 2022-01-16
Lecture halls:	Hörsal B, Building 1D. nod T, Dental school, floor 9, Hospital, Northern entry. Berga, Building 27, nod Q, floor 0, Hospital, South entry. Betula, Building 6M, nod L, floor 0. Hörsal 933, Building 1D, Unod B9 , Dental school, floor 9, Hospital, Northern entry.
Labs:	Red+Green labs and annexes, Försörjningsvägen 2B. Building 6L, entrance (målpunkt): J. Floor: 1. Door: J11
On-line activities	Zoom IDs will be sent out or announced on Canvas
Course requirements:	1. All lab work, student presentations and the ethics lecture /discussion are mandatory. Attendance to lectures and the calculation workshops is not mandatory but recommended. If you FEEL SICK, STAY HOME and inform the course leader as soon as possible. 2. Information will be in lectures and the text book.
Literature, Text book:	Goldberg *et al.*: GENETICS, from genes to genomes. 7th edition
Examination:	Written exam: TBA Re-exam: TBA
Course leader:	Yuri Schwartz yuri.schwartz@umu.se
Course administrator:	Lina Helgesson och Ingela Nilsson studieadm.molbiol@umu.se
Assistants:	Alexander Glotov alexander.glotov@umu.se Moa Lundkvist moa.lundkvist@umu.se Maria Ivanova maria.ivanova@umu.se Jennifer Pentz jennifer.pentz@umu.se Julio Guerrero julio.guerrero@umu.se
Lecturers	Jan Larsson (JL) Molecular Biology Anna Lena Chabes (AC) Medical Biochemistry and Biophysics Monica Holmberg (MH) Medical Biosciences Yuri Schwartz (YS) Molecular Biology Johan Henriksson (JH) Molecular Biology Francesca Aguilo (FA) Molecular Biology Anna Rosén (AR) Epidemiology and Global Health Kalle Grill (KG) Philosophy

EXPECTED LEARNING OUTCOMES OF THE COURSE

After the course the student:

• Should understand basic genetics and have gained an understanding of how inheritance is governed by molecular mechanisms.

• Should be able to explain how inheritance is studied at the cellular and organismal level and how allele frequencies vary in populations depending on various factors.

• Should be able to examine, interpret, and statistically evaluate the results obtained.

• Should be familiar with the study, presentation and discussion of original scientific articles.

• Should have acquired the tools to reflect on ethical problems in the application of genetic knowledge.

Date	Time	Learning Activity	Location/room
WEEK 44			
Tue 2/11	09.00 – 09.45	**Roll call + Course Introduction**	Betula
	10.00 – 12.00	**Principles of Heredity I**	Betula
	13.00 – 16.00	**Introduction and planning: Genetic Mapping Lab**	Betula
		Self study (Goldberg: Chapter 1, 2)	
wed 3/11	09.00 – 11.00	**Principles of Heredity II**	Betula
	12.00 – 14.00	**Introduction of project works: Genes and Inherited Syndromes**	Betula
		Self study (Goldberg Chapter 3, 4)	
Thu 4/11	09.00 – 11.00	**Chromosome theory of inheritance**	Betula
	13.00 - 15.00	**Genetic mapping Lab, Day 1, Group I (Learn fly pushing)**	Red lab + red anex
	15.00 - 17.00	**Genetic mapping Lab, Day 1, Group II (Learn fly pushing)**	
Fri 5/11	09.00 – 11.00	**Probability and genetics**	Betula
		Self study (Goldberg Chapter 5)	
WEEK 45			
Mon 8/11	08.00 - 10.00	**Genetic mapping Lab, Day 1, Group V (Learn fly pushing)**	Red lab + red anex
	10.00 - 12.00	**Genetic mapping Lab, Day 1, Group VI (Learn fly pushing)**	
	13.00 – 15.00	**Linkage, recombination & gene mapping I**	Betula
		Self study (Goldberg Chapter 5)	
Tue 9/11	09.00 – 11.00	**Linkage, recombination & gene mapping II**	Berga
	12.00 – 16.00	**Mutation Mapping Lab (MML). Introduction** (assistants)	Berga
		Self study (Goldberg Chapter 9)	
Wed 10/11	8.00 – 8.25	**Genetic mapping Lab, Day 2,** Group I+II, **(remove old flies)**	Red Lab
	8.25 – 8.50	**Genetic mapping Lab, Day 2,** Group III+IV **(remove old flies)**	
	09.00 – 11.00	**Gene expression**	Hörsal 933
	12.00 – 14.00	**Genetic mapping Lab, Day 2,** Group I+II **(pick virgins)**	Red Lab
	14.00 – 16.00	**Genetic mapping Lab, Day 2,** Group III+IV **(pick virgins)**	
		Self study (Goldberg Chapter 13, 19)	
Thu 11/11	8.00 – 8.25	**Genetic mapping Lab, Day 3,** Group III+IV, **(remove old flies)**	Red Lab
	8.25 – 8.50	**Genetic mapping Lab, Day 3,** Group I+II **(remove old flies)**	
	09.00 – 11.00	**Gene regulation I**	Hörsal 933
	12.00 – 14.00	**Genetic mapping Lab, Day 3,** Group III+IV **(pick virgins)**	Red Lab
	14.30 – 16.30	**Genetic mapping Lab, Day 3,** Group I+II **(pick virgins)**	
		Self study (Goldberg Chapter 13, 19)	
Fri 12/11	8.00 – 8.50	**Genetic mapping Lab, Day 2,** Group V+VI **(remove old flies)**	Red lab
	09.00 – 11.00	**Gene regulation II**	Berga
	12.00 – 14.00	**Genetic mapping Lab, Day 2,** Group V+VI **(pick virgins)**	Red Lab
		Self study (Goldberg Chapter 7, 8)	

WEEK 46

Mon 15/11	8.25 – 8.50	**Genetic mapping Lab, Day 3,** Group V+VI **(remove old flies)**	Red Lab
	9.00 – 11.00	**Mutations**	Betula
	12.00 – 14.00	**Genetic mapping Lab, Day 3,** Group V+VI **(pick virgins)**	Red Lab
		Self study (Goldberg Chapter 10, 12)	
Tue 16/11	09.00 - 11.00	**PCR and DNA sequencing techniques**	Betula
	12.00 – 13.00	**Genetic mapping Lab, Day 4,** Group I+II **(set up P cross)**	Red Lab
	13.00 – 14.00	**Genetic mapping Lab, Day 4,** Group III+IV **(set up P cross)**	
	14.00 – 15.00	**Genetic mapping Lab, Day 4,** Group V+VI **(set up P cross)**	
		Self study (Goldberg Chapter 22, 20)	
Wed 17/11	09.00 – 11.00	**Genetics of development I**	Hörsal 933
	13.00 – 17.00	**MML** Group A **(Day 1)**	Red lab + Green Lab
		Self study (Goldberg Chapter 10)	
Thu 18/11	09.00 – 13.00	**Calculation workshop A**	Betula
	14.00 – 14.30	**Genetic mapping Lab, Day 5,** Group I+II **(transfer P cross)**	Red Lab
	14.30 – 15.00	**Genetic mapping Lab, Day 5,** Group III+IV **(transfer P cross)**	
	15.00 – 15.30	**Genetic mapping Lab, Day 5,** Group V+VI **(transfer P cross)**	
		Self study (Goldberg Chapter 4, 14, 15)	
Fri 19/11	09.00 – 11.00	**Genomes**	Betula
	12:00 – 16.00	**MML** Group B **(Day 1)**	Red lab + Green Lab
		Self study (Goldberg Chapter 22, 20)	

WEEK 47

Mon 22/11	13.00 – 17.00	**MML** Group C **(Day 1)**	Red lab + Green Lab
Tue 23/11	09.00 – 11.00	**Genetics of development II**	Hörsal 933
	12.00 – 12.30	**Genetic mapping Lab, Day 6,** Group I+II **(remove P parents)**	Red lab
	12.30 – 13.00	**Genetic mapping Lab, Day 6,** Group III+IV **(remove P parents)**	
	13.00 – 13.30	**Genetic mapping Lab, Day 6,** Group V+VI **(remove P parents)**	
	14.00 – 16.00	**DNA replication and repair**	Hörsal 933
Wed 24/11	09.00 – 16.00	**MML** Group A **(Day 2)**	Red lab + Green Lab
		Self study (Goldberg Chapter 24, 25)	
Thu 25/11	09.00 – 16.00	**MML** Group B **(Day 2)**	Red lab + Green Lab
		Self study (Goldberg Chapter 24, 25)	
Fri 26/11	09.00 – 16.00	**MML** Group C **(Day 2)**	Red lab + Green Lab

WEEK 48

Mon 29/11	9.00 – 11.00	**Population genetics I**	Betula
	12.00 – 17.00	**MML** Group A **(Day 3)**	Red lab + Green Lab
Tue 30/11	09.00 – 11.00	**Population genetics II**	Betula
	12.00 – 17.00	**MML** Group B **(Day 3)**	Red lab + Green Lab
		Self study (Goldberg Chapter 10, 12)	
Wed 1/12	09.00 – 11.00	**Genetic mapping Lab, Day 7,** Group V+VI **(analyze F1, Setup F1 cross)**	Red Lab
	12.00 – 14.00	**Genetic mapping Lab, Day 7,** Group III+IV **(analyze F1, Setup F1 cross)**	
	14.00 – 16.00	**Genetic mapping Lab, Day 7,** Group I+II **(analyze F1, Setup F1 cross)**	
Thu 2/12	09.00 – 11.00	**Recombinant DNA techniques**	Betula
	12.00 – 17.00	**MML** Group C **(Day 3)**	Red lab + Green Lab
Fri 3/12	09.00 – 09.30	**Genetic mapping Lab, Day 8,** Group V+VI **(transfer F1 cross)**	Red lab
	09.30 – 10.00	**Genetic mapping Lab, Day 8,** Group III+IV **(transfer F1 cross)**	
	10.00 – 10.30	**Genetic mapping Lab, Day 8,** Group I+II **(transfer F1 cross)**	
	12.00 – 17.00	**MML (time to repeat experiments)**	Red lab + Red anex
		Self study (Goldberg Chapter 12, 25)	

WEEK 49

Mon 6/12	09.00 – 11.00	**Localization of disease genes**	Betula
	12.00 – 17.00	**MML: Sequence analysis workshop** (all groups)	Betula
Tue 7/12	09.00 – 13.00	**Calculation workshop B**	Betula
	14.30 – 15.00	**Genetic mapping Lab, Day 9,** Group I+II **(remove F1 parents)**	Red Anex
	15.00 – 15.30	**Genetic mapping Lab, Day 9,** Group III+IV **(remove F1 parents)**	
	15.30 – 16.00	**Genetic mapping Lab, Day 9,** Group V+VI **(remove F1 parents)**	
Wed 8/12	09.00 – 17.00	**MML (sequence analysis)**	Zoom
		Self study (Goldberg Chapter 6, 21)	
Thu 9/12	09.00 – 11.00	**Genome editing techniques**	Hörsal 933
	12.00 – 16.00	**Calculation workshop C**	Hörsal 933
Fri 10/12	09:00-12:00	**Ethics in Genetics (group 1, see separate schedule) (AR, KG)**	Thymine + Uracil
	13:00-16:00	**Ethics in Genetics (group 2, see separate schedule) (AR, KG)**	Thymine + Uracil

WEEK 50

Mon 13/12	09.00 – 12.00	**MML (sequence analysis)/(results defence)**	Thymine + Uracil
	09.00 – 12.00	**MML (time to repeat experiments)**	Red lab + Red Anex
	13.00 – 16.00	**MML (sequence analysis)/(results defence)**	Thymine + Uracil
	13.00 – 16.00	**MML (time to repeat experiments)**	Red lab + Red Anex
Tue 14/12	09.00 – 12.00	**MML (sequence analysis)/(results defence)**	Thymine + Uracil
		MML (time to repeat experiments)	Red lab + Red Anex
	13.00 – 17.00	**Calculation workshop D**	Betula
Wed 15/12	09.00 – 11.00	**Genetic mapping Lab, Day 10,** Group I+II **(analyze F2)**	Red Lab
	12.00 – 14.00	**Genetic mapping Lab, Day 10,** Group III+IV **(analyze F2)**	
	14.00 – 16.00	**Genetic mapping Lab, Day 10,** Group V+VI **(analyze F2)**	
Thu 16/12	09.00 – 11.00	**MML (result defense)**	Betula
	12.00 – 16.00	**Calculation workshop E**	Betula
Fri 17/12	09.00 – 11.00	**Genetic mapping Lab, Day 11,** Group V+VI **(analyze F2)**	Red Lab
	12.00 – 14.00	**Genetic mapping Lab, Day 11,** Group III+IV **(analyze F2)**	
	14.00 – 16.00	**Genetic mapping Lab, Day 11,** Group I+II **(analyze F2)**	

WEEK 51

Mon 20/12	10.00 – 12.00	**Entrepreneurship workshop (Only biomedicine program)**	Zoom
	13.00 – 17.00	**Calculation workshop F**	Betula
Thu 21/12	09.00 – 11.00	**Genetic mapping Lab, Day 12,** Group I+II **(analyze F2)**	Red Lab
	12.00 – 14.00	**Genetic mapping Lab, Day 12,** Group III+IV **(analyze F2)**	
	14.00 – 16.00	**Genetic mapping Lab, Day 12,** Group V+VI **(analyze F2)**	
Wed 22/12	09.00 – 17.00	**MML (result defense)**	Betula
Thu 23/12	09.00 – 12.00	**Self study (Project work/Lab report/preparation for exam)**	

WEEK 1

Mon 3/1	09.00 – 17.00	**Self study (Project work/Lab report/preparation for exam)**	
Fri 7/1	09.00 – 17.00	**MML (result defense)**	Hörsal 933

WEEK 2

Mon 10/1	09.00 – 17.00	**Genes and Inherited Syndromes project presentations** (see separate schedule)	Hörsal 933
Tue 11/1	09.00 – 17.00	**Genes and Inherited Syndromes project presentations** (see separate schedule)	Hörsal 933
Wed 12/1	09.00 – 17.00	**Genes and Inherited Syndromes project presentations** (see separate schedule)	Hörsal 933
Thu 13/1	09.00 – 11.00	**Questions & Answers session**	Hörsal 933
		Preparation for exam/course evaluation	
Fri 14/1	preliminary	**EXAM**	
Sun 16/1		**GML Lab reports (deadline)**	