



Molecular Ecology and Evolution BIOR25, 21 Jan. - 22 March, 2019

Dept. of Biology, <http://www.biology.lu.se/education>

Welcome to the course in Molecular Ecology & Evolution! The course is made up of two blocks. The first main block is based on lectures, laboratory and computer exercises (dry-labs). At the end of this main part (March 11), you will do an exam covering certain parts of the course literature (Freeland et al 2011), as well as knowledge that you have obtained during the laboratory and computer exercises (that is, wet- and dry-labs). The second block during the weeks 8-10 you will carry out a project in small groups (2-4 students) which will give deeper insights into a more specialized topic in molecular ecology and/or evolution. At the end of the project period (March 22), there will be one day where you make a Power Point presentation of your own project and discuss your course-mates' projects.

The second day of the course (Tuesday, January 22), we will go on a field excursion to collect samples for further studies in the lab. We will go to Stensoffa Ecological station, close to the lake Krankesjön, ca 20 km east of Lund (bring clothes for outdoor work, boots, raingear and lunch). In the afternoon we will go back to the Ecology Building and prepare for the lab-work.

Course leader, Helena Westerdahl, email: helena.westerdahl@biol.lu.se, phone: 0707765208; Staffan Bensch, email: staffan.bensch@biol.lu.se, phone: 0706827864

Other Teachers: AC, Aivars Cirulis, aivars.cirulis@biol.lu.se; BH, Bengt Hansson, bengt.hansson@biol.lu.se; CC, Charlie Cornwallis, charlie.cornwallis@biol.lu.se; EO, Emily O'Connor, emily.oconnor@biol.lu.se; HS, Hanna Sigeman, hanna.sigeman@biol.lu.se; JH, Johan Hollander, johan.hollander@biol.lu.se; JJ, Jane Jönsson, jane.jonsson@biol.lu.se; JM, Julian Melgar, julian.melgar@biol.lu.se; LR, Lars Råberg, lars.raberg@biol.lu.se; MH, Mikael Hedrén, mikael.hedren@biol.lu.se; ML, Max Lundberg, max.lundberg@biol.lu.se; NW, Niklas Wahlberg, niklas.wahlberg@biol.lu.se; SM, Samantha Mellinger, samantha.mellinger@laposte.net; TJ, Tomas Johansson, tomas.johansson@biol.lu.se; VE, Vincenzo Ellis, vincenzo.ellis@biol.lu.se

Location: see web schedule at L@L

Teaching activities: L (lecture), Sem (seminar), G (group exercise), Lab, Proj (Project)

Compulsory activities on this course are marked with "C". If you are absent from a compulsory activity without a valid reason you are not guaranteed to complete this part until the next time the course is offered. A valid reason can be e.g. that you are ill, but not that you are on a trip!

Literature: Molecular Ecology: Second edition. 2011. Freeland, JR., Kirk, H., Petersen, SD. Wiley-Blackwell, ISBN 978-0-470-748233-6

Before the start of the course you must read the documents "General information" and Plagiarism and cheating

[General information](#)

[Plagiarism and cheating](#)

Additional information for students can be found at

[Current student at LU](#)

[Current student at Dept. of Biol.](#)

[Students rights and guidelines](#)

Learning platform: [L@L](#)

Date	Time	Activity	Compulsory	Description	Teacher
Mo. 21 Jan.	10:00-11:15	Introduction	C	Introduction and presentation	Helena Westerdahl, Staffan Bensch
	11:30-12:00	Excursion prep	C	Gather equipment and prepare for excursion	
	13:00-14:00	L		DNA diagnostics and BarCoding	Staffan Bensch
Tu. 22 Jan.	08:30-15:00	Excursion	C	Excursion	Staffan Bensch, Helena Westerdahl, Johan Hollander
	15:00-16:00	Lab	C	DNA extraction	Julian Melgar, Samantha Mellinger
We. 23 Jan.	08:00-12:30	Lab	C	DNA extraction continued	Julian Melgar, Samantha Mellinger



	13:30-14:30	L		Basic PCR and Sequencing	Helena Westerdahl
	14:30-16:30	Lab	C	DNA extraction continued / set up PCR	Julian Melgar, Samantha Mellinger
Th. 24 Jan.	09:00-10:00	Sem	C	Chapter 1 & 2 (p. 35-43)	Hanna Sigeman, Aivars Cirulis
	10:30-13:00	Lab	C	DNA extraction continued / set up PCR	Julian Melgar, Samantha Mellinger
	13:00-14:30			Information om utbytesstudier (in Swedish)	Tina Ledje
	13:00-17:00			No scheduled classes	
Fr. 25 Jan.	08:00-12:00	Lab	C	PCR products on minigels, precipitate PCR	Julian Melgar, Samantha Mellinger
	13:00-14:15	L		Sequence analyses & phylogenetic trees 1	Staffan Bensch
	14:30-16:30	Lab	C	PCR for sequencing reaction	Julian Melgar, Samantha Mellinger
Mo. 28 Jan.	09:00-11:00	Lab	C	Internet-based sequence analyses	Staffan Bensch
	11:15-12:00	Lab	C	PCR continued, precipitate sequencing rxn	Julian Melgar, Samantha Mellinger
	13:00-16:30	Lab	C	Continued, sequence rxn to ABI robot	Julian Melgar, Samantha Mellinger
Tu. 29 Jan.	09:00-09:30	L		DNA seq & alignment	Staffan Bensch
	09:30-11:30	Lab	C	Alignment Exercise	Staffan Bensch
	12:30-13:30	L		Sequence databases	Max Lundberg
	13:30-16:00	Lab	C	BLAST & ORF	Max Lundberg, Helena Westerdahl
We. 30 Jan.	09:00-10:00	L		Phylogenetic trees 1	Staffan Bensch
	10:30-12:00	Lab	C	Editing & aligning obtained sequences	Staffan Bensch
	13:00-16:00	Lab	C	Editing & aligning obtained sequences, continued	Staffan Bensch
Th. 31 Jan.	09:00-10:15	L		Phylogenetic trees 2	Staffan Bensch
	10:45-12:15	L		Molecular clocks and dating	Niklas Wahlberg
	13:00-17:00			No scheduled classes	
Fr. 1 Feb.	08:30-12:00	Lab	C	Neighbor joining and other tree analyses of sequences	Staffan Bensch
	13:00-14:00	Sem	C	Chapter 2 (p. 45-72) & 3	Emily O'Connor, Aivars Cirulis
Mo. 4 Feb.	09:00-12:00	Individual studies		Prepare for presentation	
	13:00-16:00	Sem	C	Presentation projects BarCoding	Staffan Bensch, Helena Westerdahl, Johan Hollander
Tu. 5 Feb..	09:00-10:00	L		Molecular methods	Helena Westerdahl
	10:30-12:00	Sem	C	Chapter 4 (F-statistics and gene flow)	Emily O'Connor, Vincenzo Ellis
	13:00-14:30	Lab	C	Primer design	Staffan Bensch
We. 6 Feb..	09:00-10:30	L		Genes in populations - diversity and structure	Bengt Hansson
	10:30-12:00	Lab	C	Population structure - microsatellites (GenAlEx)	Bengt Hansson
	13:00-16:00	Lab	C	Population structure - microsatellites (GenAlEx)	Bengt Hansson
Th. 7 Feb.	09:00-10:00	L		Fst, Nm Ho, He, Fis, HW, LD	Bengt Hansson
	10:00-11:00	Sem	C	Population structure - microsatellites (structure)	Bengt Hansson
	11:00-12:00	Lab	C	Population structure - mtDNA (DnaSP)	Bengt Hansson
	13:00-15:00		Comp.	Information about Master's degree projects, compulsory for Master's students in Biology	J-Å Nilsson
	13:00-15:00		Comp.	Information about Master's degree projects, compulsory for Master's students in Molecular Biology	Klas Flärdh
	13:00-17:00			No scheduled classes	
Fr. 8 Feb.	09:00-11:00	Lab	C	Population structure - mtDNA (DnaSP)	Bengt Hansson
	11:00-12:00	Lab	C	Population structure - summary	Bengt Hansson
	13:00-14:30	Sem	C	Chapter 8 (Conservation genetics)	Hanna Sigeman, Aivars Cirulis
Mo. 11 Feb.	09:00-10:15	L		Population structure and phylogeography	Mikael Hedrén
	10:30-11:00	Sem	C	Phylogeographic papers: select	Mikael Hedrén
	11:30-12:30	Sem	C	Chapter 6 (Phylogeography)	Hanna Sigeman, Vincenzo Ellis
	13:00-16:00	Individual studies		Preparation of presentation on phylogeographic papers	Mikael Hedrén
Tu. 12 Feb.	09:00-12:00	Sem	C	Phylogeography: presentation of phyl. Paper	Mikael Hedrén
	13:00-14:00	L		Intro from genotype to phenotype	Helena Westerdahl

	14:15-15:00	Sem	C	Start literature project "From genotype to phenotype"	Helena Westerdahl, Lars Råberg, Charlie Cornwallis
We. 13 Feb.	09:00-10:00	L		From genotype to phenotype continued	Helena Westerdahl
	10:00-12:00	Lab	C	Aligning and studying coding DNA	Samantha Mellinger, Helena Westerdahl
	13:00-14:00	Lab	C	Aligning and studying coding DNA	Samantha Mellinger, Helena Westerdahl
	14:00-16:00	Individual studies		Literature project, continued	
Th. 14 Feb.	09:00-10:00	Sem	C	Papers about genetics of adaptations	Hanna Sigeman, Emily O'Connor
	10:15-11:00	L		QTL and GWAS	Charlie Cornwallis
	13:00-17:00			No scheduled classes	
Fr. 15 Feb.	09:00-12:00	Lab	C	Selection at the molecular level	Lars Råberg
	13:00-14:00	Lab	C	Selection at the molecular level, continued	Lars Råberg
Mo. 18 Feb.	09:00-16:00	Individual studies		Literature project, continued	Lars Råberg, Helena Westerdahl, Charlie Cornwallis
Tu. 19 Feb.	09:00-16:00	Individual studies		Literature project, continued	
We. 20 Feb.	09:00-14:00	Individual studies		Literature project, continued	
	14:00-16:00	Individual studies		Literature project, continued	
	16:00-17.30			Biologer i utbildning och arbetsliv. Information om akademiska karriärvägar och masterprogram (in Swedish)	Jep Agrell Fredrik Johansson
Th. 21 Feb.	09:00-12:00	Individual studies		Literature project, continued. 12:00 project submission	
	13:00-17:00			No scheduled classes	
Fr. 22 Feb.	09:00-16:00	Individual studies		Literature project, Preparation of presentation and opposition	
Mo. 25 Feb.	09:00-12:00	Sem	C	Literature project: Presentation and discussion	Lars Råberg, Helena Westerdahl, Charlie Cornwallis
	13:00-13:30	L		Genomics - case studies	Helena Westerdahl
	13:30-14:00	L		Genomics - case studies	Max Lundberg
	14:15-15:15	Information		Presentation of titles - research projects	Helena Westerdahl
Tu. 26 Feb.	10:00-12:00	L		Genomes and NGS approaches	Tomas Johansson
	13:00-16:00	Lab	C	Mapping and assambling NGS reads	Staffan Bensch, Vincenzo Ellis
We. 27 Feb.	09:00-12:00	Individual studies		Read papers about Genomics	
Th. 28 Feb.	10:00-12:00	L		Transcriptomes and functional genomics	Tomas Johansson
	13:00-18:00			Re-exam, courses autumn period 2	
Fr. 1 Mar.	09:00-16:00	Lab	C	Transcriptional analyses	Tomas Johansson
Mo. 4 Mar.	09:00-12:00	Individual studies		Write lab-report Transcriptional analyses	
Tu. 5 Mar.	10:00-12:00	Sem	C	Papers about genomics	Emily O'Connor, Vincenzo Ellis
We. 6 Mar.	09:00-10:00	Information		Questions on the Exam	Staffan Bensch, Helena Westerdahl, etc
	13:00-16:00	Individual studies		Prepare for exam	
Th. 7 Mar.					
	09:00-12:00	Individual studies		Prepare for exam	
	13:00-17:00			No scheduled classes	
Fr. 8 Mar.	09:00-16:00	Individual studies		Prepare for exam	
Mo. 11 Mar.	09:00-16:00	Examination		Written exam	Staffan Bensch, Helena Westerdahl, etc
Tu. 12 Mar.	09:00:16:00	Proj	C	Research Project	Samantha Mellinger, ?, Jane Jönsson
We. 13 Mar.	09:00:16:00	Proj	C	Research Project	
Th. 14 Mar.	09:00:12:00	Proj	C	Research Project	
	13:00-17:00			No scheduled classes	
Fr. 15 Mar.	09:00:16:00	Proj	C	Research Project	
Mo. 18 Mar.	09:00:16:00	Proj	C	Research Project	
Tu. 19 Mar.	09:00:16:00	Proj	C	Research Project	
We. 20 Mar.	09:00:16:00	Proj	C	Research Project	



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Th. 21 Mar.	09:00-12:00	Proj	C	Research Project	
	13.00-17.00			No scheduled classes	
Fr. 22 Mar.	08:30-12:30	Sem	c	Presentation of Research Projects	Staffan Bensch, Helena Westerdahl, etc
Th. 28 Mar.			C	Do the course evaluation, Please!!	
Date for the re-exam will be decided later in discussion with the students in need of a re-exam					