Institute of Evolutionary Biology and Environmental Studies
University Zurich

Specialised Master's Program in Environmental Sciences

Course program 2011 - 2012

Address	Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich
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COURSE OVERVIEW (90 CP)

Module	Courses	CP
UWW 220	***Biodiversity Theory and Assessment***	**4**
UWW 221	Part 1: Biodiversity theory	
UWW 222	Part 2: Field course in biodiversity assessment and monitoring	
UWW 230	***Resource Management and Conservation***	**4**
UWW 231	Analysis and management of biological populations	
UWW 232	Human Dimensions of conservation biology	
UWW 240	***Environmental Valuation and Perception***	**4**
UWW 241	Biological wealth management	
UWW 242	Environmental perception	
UWW 250	***Landscape Ecology and Planning***	**4**
UWW 251	The ecological study of biodiversity: concepts and methods	
UWW 252	Spatial ecology and remote sensing	
UWW 260	***Research Methods***	**4**
UWW 261	Part 1: Introduction into research methods and study design	
UWW 262	Part 2: Presentation and discussion of master projects	
UWW 270	***Quantitative Analysis***	**4**
UWW 271	Contemporary analysis for ecology	
UWW 272	Global change and ecosystem ecology	
UWW 280	***Special topics***	**4**
UWW 281	E.g. placement, course-work, courses from other subjects	
UWW 290	***Research seminars***	**2**
UWW 291	Journal Club: discussion of papers	
UWW 292	Research seminars: invited speakers	
UWW 200	***Master Thesis***	**50**
UWW 210	***Master Exam***	**10**

UWW 221	**Biodiversity theory**
Credit points	2 CP
Date	3rd October to 7th October 2011, daily from 9 am to 5 pm
Place	WIG
Course tutors	Prof. Dr. Bernhard Schmid, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: bernhard.schmid@ieu.uzh.ch Dr. Marcel Van der Heijden, Agroscope Reckenholz Zürich
Content	Our planet Earth is unique because it is covered by a biosphere which maintains global processes such as hydrological cycles and climate. This is possible because the biosphere is made up of a great variety of living organisms connected in a large interaction web. But how does this web function? Why should a large web work better than a simple one? These are central questions in linking biodiversity and environmental research. However, we may also ask how the biodiversity we find today has been generated and is being maintained, from variation within species to variation between species and ecosystems. Studying patterns of biodiversity and the organismic interactions affecting biodiversity can help us understand how ecosystems function, how they provide services to humans and how humans in turn can safeguard these functions and services by prudent management.
Requirements to obtain the credit points	Written examination on Monday 13th February 2012 at 9 am
Literature	To be announced

UWW 222	**Field course in biodiversity assessment and monitoring**
Credit points	2 CP
Date	One-week camp in July or August 2012
Place	To be announced
Course tutor	PD Dr. Helmut Brandl, Institute of Evolutionary Biology and Environmental Sciences, University Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: helmut.brandl@ieu.uzh.ch Dr. Eva Knop, Institut für Ökologie und Evolution, Universität Bern, Baltzerstrasse 6, 3012 Bern, email: eva.knop@iee.unibe.ch Dr. Deborah Vogt, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: deborah.vogt@ieu.uzh.ch
Content	For practical purposes the most urgent need in protecting biodiversity is to know what biodiversity there is in a certain place and how it changes over time. Because biodiversity is not a continuously distributed, homogeneous resource, its measurement is difficult and requires a multitude of tools and methods. For example, flowering plants may easily be counted but snakes may be hidden most of the time a site is being visited. Soil organisms, which play an important recycling role in the ecosystem, must first be extracted and in the case of microscopic fungi, amoeba, bacteria etc. be identified with special assays. Good statistical design of assessment and monitoring programmes maximizes accuracy for given costs.
Requirements to obtain the credit points	To be announced
Literature	To be announced

UWW 231	**Analysis and management of biological populations**
Credit points	2 CP
Date	17th October to 21st October 2011, daily from 9 am to 5 pm
Place	WIG
Course organizer	Dr. Philippe Saner, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: philippe.saner@ieu.uzh.ch Dr. Martin Bauert, Kurator Naturschutz und Botanik, Zoo Zürich, email: martin.bauert@zoo.ch PD Dr. Matthias Diemer, Leiter Internationale Projekte, WWF Schweiz, email: Matthias.diemer@ieu.uzh.ch Dr. Dennis Hansen, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, email: dennis.hansen@ieu.uzh.ch Dr. Christoph Kueffer, Institut für Integrative Biologie, ETH Zurich, Universitätstrasse 16, 8092 Zürich, email: christoph.kueffer@env.ethz.ch
Content	Successfully applied conservation has to be based on sound ecological theory. This course will teach the theoretical background of conservation ecology.
Programme	The course will cover questions on the value of biological diversity, extinction processes and assessment of extinction risk, conservation genetics, spatial implications of fragmentation and metapopulation dynamics, consequences of biological invasions, conservation biology of complex biological interactions, protected areas and restoration ecology.
Requirements to obtain the credit points	Written examination on Wednesday 8th February 2012 at 9 am
Literature	Papers to be distributed during course

UWW 232	**Human Dimensions of conservation biology**
Credit points	2 CP
Date	Fridays 9.00-13.00, 4th November to 9th December 2011
Place	WIG
Course tutors	PD Dr. Marcus Hall, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: marcus.hall@ieu.uzh.ch
Content	Conservation biology is a relatively new scientific subject that integrates biology, environmental science, economy, politics and social science. This results in a range of interests and debates on what, how and where things should be conserved, and over time these views on conservation and restoration management have changed. We will look at case studies of long-term conservation projects and analyse them in terms of historical background, the changes and evolution in conservation thinking and the current implications for conservation biologists and restoration management practices.
Requirements to obtain the credit points	To be announced
Literature	Papers to be distributed during course

UWW 241	**Biological wealth management**
Credit points	2 CP
Date	10th October to 14th October 2010, daily from 8.30 am to 4.45 pm (Friday only till 12.30 am)
Place	WIG
Course tutor	Prof. Dr. Stefan Baumgärtner, Department of Sustainability Sciences, Leuphana University of Lüneburg, Germany email: baumgaertner@uni.leuphana.de
Content	In this course, students will learn to analyze the management of biodiversity from an economic perspective. To this end, standard concepts and methods of environmental and resource economics are covered in the first part of the course (welfare economics, market failure, externalities, public goods, open access resources, efficient resource management, environmental and resource policy instruments). In the second part of the course, these concepts and methods are then applied to the issue of biodiversity loss and protection. While biodiversity is an issue of biology in the first place, the economic perspective can add valuable insights into why we are currently loosing biodiversity at unusually high rates, why this is a problem that we should be concerned about, and what we can do in order to protect biodiversity in an effective and efficient manner. Through this course, students should develop the capacity to integrate concepts and methods from economics in an interdisciplinary manner with concepts and methods from ecology, to yield an encompassing ecological-economic understanding of biodiversity.
Requirements to obtain the credit points	Presentation during course, personal study-accomplishment essay (to be submitted before Wednesday 8th February 2012
Literature	To be announced

UWW 242	**Environmental perception**
Credit points	2 CP
Date	26th September to 30th September 2011, daily from 9 am to 5 pm
Place	WIG
Course tutor	Prof. Dr. Petra Lindemann-Matthies, Institut für Naturwissenschaften, Abteilung Biologie, Pädagogische Hochschule Karlsruhe, Bismarckstr. 10, D-76060 Karlsruhe, Deutschland email: petra.lindemann-matthies@ph-karlsruhe.de
Content	This course is about nature, but it is also about people. Nature is a valued and appreciated part of the life of people and many think that nature is important in itself rather than for some extrinsic reason.
Programme	In the course we will (1) investigate people's attitudes towards nature and the environment and ask why some people are more concerned about nature and the environment than others, (2) study people's perception and appreciation of nature, in particular of biodiversity, and their aesthetic preferences for plants, animals and natural landscapes, and (3) investigate benefits and satisfaction derived from experiencing nature and study people's inherent affiliation with nature (biophilia hypothesis).
Requirements to obtain the credit points	Presentations, written report
Literature	Papers to be distributed during course

UWW 251	**The ecological study of biodiversity: concepts and methods**
Credit points	2 CP
Date	Wednesdays 9.00-13.00, 2nd November to 7th December 2011
Place	WIG
Course tutor	Prof. Dr. Owen Petchey, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: owen.petchey@ieu.uzh.ch
Content	The course covers the ecological study of biodiversity both in theory and practice. Topics covered include: - Neutral theories - Biodiversity and community ecology - The modern niche concept - Competition and coexistence - Biodiversity and ecosystem functioning - Scientific inference in ecology.
Requirements to obtain the credit points	Written examination on Friday 10th February 2012 at 9 am
Literature	Begon, M., Townsend, C. R. and Harper, J. L. (2006) Ecology- From Individuals to Ecosystems.

UWW 252	**Spatial ecology and remote sensing**
Credit points	2 CP
Date	9th January to 13th January 2012, daily from 9 am to 5 pm
Place	Y11-J-05
Course tutor	Dr. Gabriela Schaepman-Strub, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: gabriela.schaepman@ieu.uzh.ch
Content	This course is an introduction to scientific concepts and methods in spatial ecology. Scientific approaches in landscape research relate spatial pattern and processes using quantitative methods and local modelling. Special attention will be given to satellite-inferred data on spatio-temporal dynamics of vegetation relating to climate.
Programme	The course includes lectures, hands-on computer labs, and a literature seminar. The lectures give an overview over the research field and assess spatial pattern and process relationships. Quantitative concepts and methods used in spatial analysis are demonstrated in a computer lab with exercises in GIS, quantitative spatial modelling, remote sensing, and basic statistics. The aim of the course is to provide basic knowledge and skills in spatial ecology that can be applied in the master thesis.
Requirements to obtain the credit points	Written examination on Friday 10th February 2012 at 10.30 am
Literature	To be announced

UWW 261	**Introduction into research methods and study design**
Credit points	2 CP
Date	19th September to 23rd September 2011, daily from 9 am to 5 pm
Place	19th September in the library 13 H 36, afterwards in the WIG
Course tutor	Prof. Dr. Bernhard Schmid, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: bernhard.schmid@ieu.uzh.ch
Content	The study objects of environmental sciences are complex and variable. This does not preclude quantitative analysis and interpretation, but requires special methodological approaches that can deal with variability, stochasticity and uncertainty. Often replication is an essential issue in experiments, whereas observation may only be possible on a single watershed or population of a rare species. Furthermore, real problem solving usually involves consideration of socio-economic factors and an integrative, interdisciplinary study design.
Programme	Knowledge, research methods, how to prepare a project, study design
Requirements to obtain the credit points	Written examination on Monday 13th February 2012 at 10.30 am
Literature	References will be given in the course

UWW 262	**Presentation and discussion of master projects**
Credit points	2 CP
Date	12th December to 16th December 2011, daily from 9 am to 5 pm
Place	WIG
Course tutor	Prof. Dr. Bernhard Schmid, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: bernhard.schmid@ieu.uzh.ch
Content	The proposals for the master projects will be presented and defended in class. Criteria for good proposals are originality, innovation and relevance of the question, an efficient design for answering it, feasibility and a short but balanced review of the wider theoretical / conceptual framework.
Programme	Students develop the study question and study design for their master project between September and December.
Requirements to obtain the credit points	At the end of this course the master project with thesis title, time schedule, and infrastructure requirements must be submitted to obtain the 2 credit points and begin the practical thesis work.
Literature	Literature specific to each master project has to be searched for by the students themselves (with help from supervisors).

UWW 271	**Contemporary analysis for ecology: Part 1**
Credit points	2 CP
Date	Wednesdays from 2 pm to 6 pm, 24th October to 21st November 2011 Thursday 27th October from 9 am to 1 pm
Place	WIG
Course tutor	PD Dr. Pascal Niklaus, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: pascal.niklaus@ieu.uzh.ch
Content	This course gives an introduction to data processing and analysis using the R language for statistical computing and graphics. R is a software package for statistics and graphics that is closely related to the commercial S-plus package and the S computing language, but which is freely available via the web under a GNU license.
Programme	The course combines lectures and computing practicals and will mainly cover linear models and analysis of variance, and also gives an introduction into using R.
Requirements for course attendance	Course participants can bring their own laptop (PC or Mac) if they prefer, after downloading R from: http://stat.ethz.ch/CRAN/
Requirements to obtain the credit points	Written examination on Wednesday 15th February 2012 at 9 am
Literature	Crawley, M.J. (2005) Statistics: An introduction using R. John Wiley and Sons, Ltd.

UWW 272	**Global change and ecosystem ecology**
Credit points	2 CP
Date	Tuesdays from 2 pm to 6 pm, 1st November to 6th December 2011
Place	WIG
Course tutor	PD Dr. Pascal Niklaus, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: pascal.niklaus@ieu.uzh.ch
Content	Anthropogenically driven changes in environmental conditions affect biological systems at many levels. This course focuses on a number of important components of global change (rising atmospheric CO2 concentrations, global warming, eutrophication, etc.) and their effects on the functioning and structure of terrestrial ecosystems. For each topic, the fundamentals of the underlying biogeochemical processes will be introduced and practical examples of ongoing global change research discussed. This will involve the quantitative analysis of selected data sets and the discussion of the implications of the results found. It is therefore essential that the participants have attended UWW271.
Requirements to obtain the credit points	Written examination on Wednesday 15th February 2012 at 10.30 am
Literature	To be announced

UWW 280	**Special topics**
Credit points	4 CP
Coordinator	Claudia Hegglin, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: claudia.hegglin@ieu.uzh.ch
Optional topics	*Coursework (2 CP)* An important part of every piece of scientific work is the written report in which the results of the research are made more accessible. The production of an essay offers the student practical experience in scientific writing. The subject can be chosen independently, or can originate from a course taken. *Placement (4 CP)* As an interface between university life and practice, the placement offers an insight into the professional world. Experiences such as project handling, working as part of a team, forging contacts with other disciplines or working groups and using communication and organisation skills, are an important addition to the knowledge and theories gained from the university studies. The placement serves as a point of reference in the selection of a future profession and can provide new perspectives when choosing specific programmes of further training. In addition, it enables contacts to be made with professionals from the environmental sector thus making it easier to enter a profession outside of university life. An information leaflet, which contains detailed instructions and a registration form, can be collected from the Co-ordination Office. In addition, a folder containing addresses of placement possibilities is available for examination at the office. *Courses from other subjects* Courses from the Graduate Programm in Ecology or from other subjects can be credited if they are a valuable addition to our own Master courses.
Requirements to obtain the credit points	To be announced

UWW 291	**Journal Club**
Credit points	1 CP
Date	Thursdays from 10 am to 12 am, 10th November to 8th December 2011
Place	Library 13 H 36
Coordinator	Dr. Dennis Hansen, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: dennis.hansen@ieu.uzh.ch
Content	In the Journal Club primary scientific literature from peer-reviewed journals will be selected, presented and discussed.
Requirements to obtain the credit point	To be announced

UWW 292	**Research seminars**
Credit points	1 CP
Date	BEEES: Every week on Tuesday, 12 to 2 pm SEBES: Every week on Thursday, 4 to 6 pm
Place	For further information visit: http://www.ieu.uzh.ch/seminars.html
Coordinator	Prof. Dr. Andrew Hector, Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, CH-8057 Zurich, email: andrew.hector@ieu.uzh.ch
Content	In the scientific research seminar, national and international researchers present their newest results. There are discussions on the presented topics afterwards.
Requirements to obtain the credit point	One lectures summarized on one side of A4. The summary should include brief descriptions of: - The background - The aims - The methods used - The results - A discussion of the conclusions and implications - A few key supporting references for published aspects of the work and/or the background to the research.