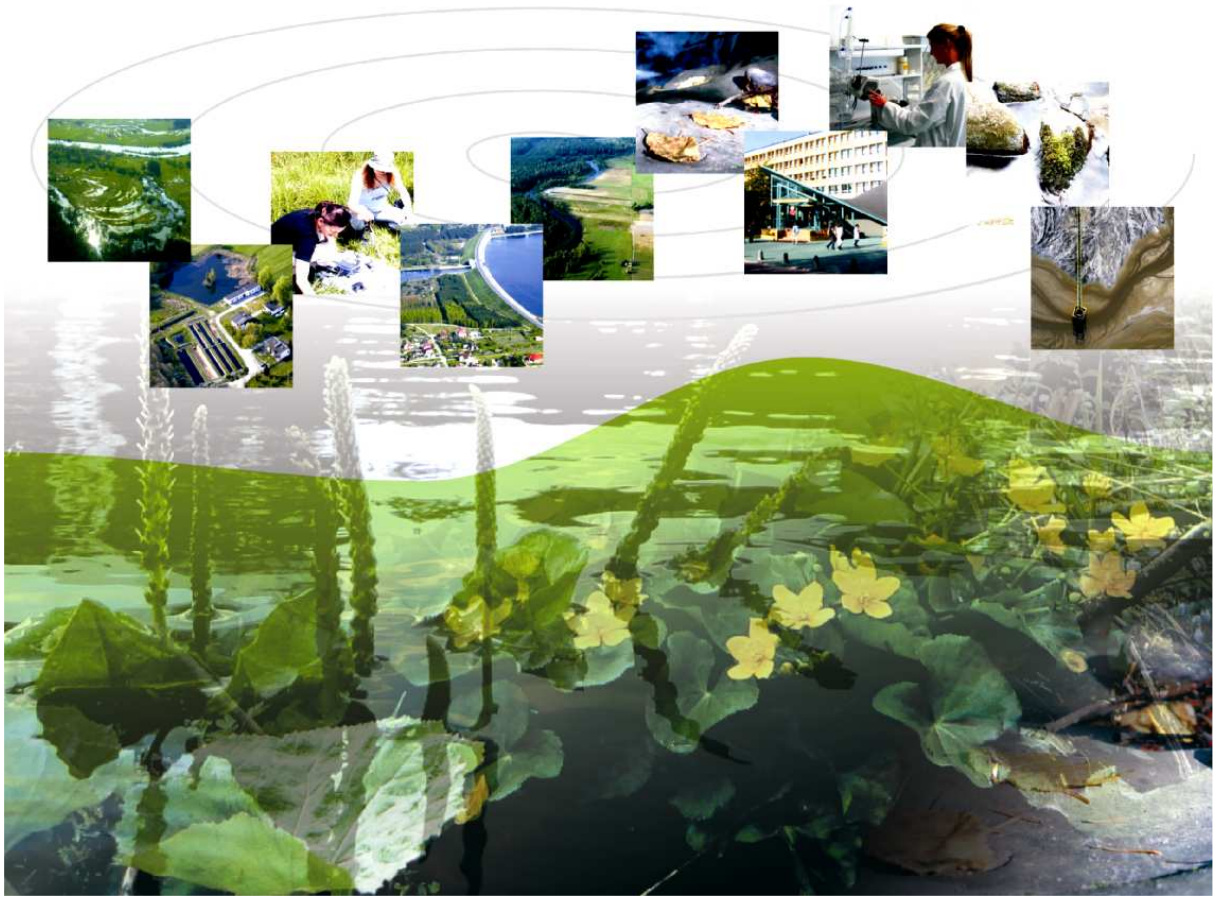
COURSE BOOK 2011-2013

MASTER OF SCIENCE IN ENVIRONMENTAL PROTECTION

IN SCOPE OF ECOHYDROLOGY



MASTER OF SCIENCE IN ENVIRONMENTAL PROTECTION IN SCOPE OF ECOHYDROLOGY

COORDINATING INSTITUTION

University of Lodz
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PARTNER INSTITUTION

United Nations Educational, Scientific and Cultural Organization
ERCE European Regional Centre for Ecohydrology Under the auspices of UNESCO
PAN POLSKA AKADEMIA NAUK

International Institute of the Polish Academy of Sciences -
European Regional Centre for Ecohydrology (ERCE)
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MASTER OF SCIENCE IN ENVIRONMENTAL PROTECTION

IN SCOPE OF ECOHYDROLOGY

SECOND-LEVEL STUDIES IN ENGLISH (2 years)

MASTER IN ENVIRONMENTAL PROTECTION IN SCOPE OF ECOHYDROLOGY (*MEP-EH*).

second-level studies in English (2 years)

- stationary, limit of places: 20 (min. 10)
- recruitment since academic year 2011/2012

Master in Environmental Protection in scope of Ecohydrology is realized in the cooperation of University of Lodz (UL) and the International Institute of the Polish Academy of Sciences - European Regional Centre for Ecohydrology under the auspices of UNESCO (ERCE) in Lodz.

GRADUATE PROFILE

The Master in Environmental Protection in scope of Ecohydrology aims to create highly specialized professionals in the area of Ecohydrology (EH). Graduate understands the link between ecology and hydrology and knows how to use it as a management tool for protection and management of the natural environment, in context of modern methods and ecological biotechnologies, and with consideration of current environmental policy. Graduate posses knowledge and understanding of the ecological processes that support the resilience of aquatic ecosystems and how to harmonize them with existing engineering infrastructures at the river basin scale to achieve sustainable aquatic ecosystems use and to reverse the processes of human caused degradation.
Graduate posses an holistic perspective of freshwater ecosystems functioning, under natural and anthropogenic pressures, and a knowledge how to regulate ecological processes based on understanding "water - biota interactions", from molecular (e.g., microbial loop) to ecosystem (biomanipulation) and to landscape scales (reforestation, creation of land/water ecotone zones). Graduate understands the social and economic value of aquatic ecosystems, and is able to develop the research and applications required to support and implement conservation and adaptation measures for the sustainable management of aquatic environments. Graduate is qualified to use advanced tools in the planning, conception and design phases of ecohydrological projects. Graduate posses necessary communication and research skills for integrated team work and is able to develop decision supporting systems for community policy and to create an interface between researchers, stakeholders and decision makers.

ADMISSION PROCEDURE

For applicant who has successfully accomplished a first degree of higher education equivalent to a B.Sc. degree in one of the following subjects: biology, ecology, geosciences, environmental protection, limnology, hydrology, aquatic engineering or any similar subject.
Admission procedure requires the legalized Bachelor's Degree Diploma (or other document confirming bachelor's degree studies graduation) with the transcript of records and the English Language Certificate.

Admission procedure on:
www.uni.lodz.pl
http://iso.uni.lodz.pl/index.php/polish/studiesinenglish
http://iso.uni.lodz.pl/index.php/polish/admision

Deadline:
15 July 2011 for European and non-European students

Candidate has to send or bring oneself all required original documents to:
University of Lodz
International Relations Office
Narutowicza 65
90-131 Lodz, Poland
e-mail: iso@uni.lodz.pl
fax: +48 42 635 47 89l

FEE

3000 Euro per year + 200 Euro a non - reimbursable application fee
http://iso.uni.lodz.pl/index.php/polish/fees

WHAT IS ECOHYDROLOGY?

Ecohydrology (EH) is a sub-discipline of hydrology that seeks to understand the ecological processes controlled by the hydrological cycle. It strives to utilize this understanding in management of both to enhance sustainability in river basins (Zalewski 2000, 2009).

The general assumption of EH is to reverse degradation and achieve sustainable water and ecosystems in anthropogenially-modified basins. In addition to the reduction of erosion, nutrients and pollutant emissions there is a necessity to regulate ecological processes based on understanding "water - biota interactions", from molecular (e.g., microbial loop) to ecosystem (biomanipulation) and to landscape scales (reforestation, creation land/water ecotone zones).

Two halves of ecohydrology can be distinguished:

(1) Atmospheric / terrestrial, where the major question is how plant cover changes the dynamic water balance and nutrient/pollutant transfer in to aquatic ecosystems,

(2) Aquatic, where biotic interactions may change nutrient/pollutant allocation from dynamic to non-available pools, such as changing the intensity of eutrophication (by an order of magnitude).

EH concepts providing a framework for its implementation:

(1) Hydrological: the quantification of the hydrological cycle of a basin, should be the template for functional integration of hydrological and biological processes,

(2) Ecological: integrated processes at a river basin scale can be steered in such a way as to enhance the basin's carrying capacity (resilience, biodiversity and ecosystem services),

(3) Ecological engineering: the "key element of EH as a new tool for Integrated Water Resources Management (IWRM) is "dual regulation" - use of the understanding of terrestrial and aquatic organisms' adaptation to water quality and dynamics.

EH can be expressed by testable hypotheses, as follows:

(1) Hydrological processes generally regulate biota,
(2) Biota can be shaped as a tool to regulate hydrological processes,
(3) These two types of regulations can be harmonized with hydrotechnical infrastructure to achieve sustainable water and ecosystem services.

EH methodology of science:

EH is integrative - a transdisciplinary, problem-solving science based upon the deductive concept, formulated from the general theory of physics, hydrology and ecology (AB regulation, Zalewski and Naiman , 1985) and verified by inductive research on effects of hydrology, throphic cascade structure, pattern of nutrient circulation and water quality. As a transdisciplinary science, the implicit goal of which is to achieve sustainability EH integrates not only hydrology and ecology but also considers geophysics, geology, molecular biology, genetics, mathematical modeling with socio-economical (e.g. foresight) and legal aspects.

EH goals as a problem-solving science:

(1) Slowing down the transfer of water from the atmosphere to the sea (considering flood and drought control as priorities),
(2) Reduce input and regulate the allocation of excess nutrients and pollutants in aquatic ecosystems to improve water quality, biodiversity and human health,
(3) Enhancement of ecosystem carrying capacity (resilience, biodiversity, ecosystem services for society) in harmonization with the societal needs within the framework of Integrated Water Resources Management (IWRM).

"DUAL REGULATION"
regulation of biota by altering hydrology,
and regulation of hydrology by shaping biota

HARMONIZATION
of ecohydrological measures
with necessary
hydrotechnical solutions

INTEGRATION
of various regulations acts
in a synergistic way to stabilize
and improve the quality of water

Basic references for ECOHYDROLOGY on-line

Zalewski M. (ed.). 2002. Guidelines for the Integrated Management of the Watershed Phytotechnology and Ecohydrology. UNEP-IETC, UNESCO IHP , UNEP DTIE IETC. Freshwater Management Series No. 5, 188 pp.
www.unep.or.jp/ietc/Publications/Freshwater/FMS5

Zalewski M., Wagner-Lotkowska I. (eds). 2004. Integrated Watershed Management-Ecohydrology & Phytotechnology - Manual. UNESCO IHP, UNESCO - ROSTE, UNEP-DTIE-IETC, ICE PAS, DAE UL, Venice, Osaka, Warsaw, Lodz. 208 pp.
www.unep.or.jp/ietc/publications/freshwater/ watershed_manual

Zalewski M. 2009. Ecohydrology: A framework for reversing the degradation of the Baltic Sea. BALTEX Newsletter.
www.bssc2009.org

Zalewski M. 2009. Ecohydrology for engineering harmony between environment and society. Danube News 19.
www.iad.gs/docs/Danube_News_19.pdf

EH books and journals

MASTER OF SCIENCE IN ENVIRONMENTAL PROTECTION IN SCOPE OF ECOHYDROLOGY

COURSES:
Master in Environmental Protection in scope of Ecohydrology (*MEP-EH*): 2011-2013

FIRST YEAR

SEMESTER 1	Hours	ECTS	Lecturer
1. Ecohydrology	**42** (22 lec, 20 lab)	**5**	Prof. M. Zalewski
2. Environmental Modelling and Statistics	**30** (10 lec, 20 lab)	**3**	Dr M. Stolarska
3. Ecotoxicology	**48** (24 lec, 24 lab)	**5**	Dr hab. J. Mankiewicz-Boczek
4. Environmental / Landscape Planning	**44** (24 lec, 20 lab)	**5**	Dr K. Krauze
5. Environmental Protection Politics	**42** (30 lec, 12 lab)	**5**	Dr M. Michalak
6. Ecological Risk Assessment	**30** (10 lec, 20 lab)	**5**	Dr T. Jurczak
Thesis Seminary	**30**	**1**	
Thesis Laboratory	**60**	**1**	
TOTAL	**326**	**30**	

SEMESTER 2	Hours	ECTS	Lecturer
7. Applied Aquatic Ecology	**30** (14 lec, 16 lab)	**4**	Dr M. Łapińska
8. Applied Hydrology	**30** (14 lec, 16 lab)	**4**	Dr M. Stolarska
9. Ecohydrology Aplication in Urban Areas	**30** (14 lec, 16 lab)	**4**	Dr I. Wagner
10. Phytotechnologies & Phytoremediation	**36** (16 lec, 20 lab)	**5**	Dr A. Drobniewska
11. Wetlands & Land-Water Ecotones	**18** (8 lec, 10 lab)	**3**	Dr E. Kiedrzyńska
12. Ecohydrology for Sustainable Fisheries & Aquaculture	**24** (10 lec, 14 lab	**3**	Dr Z. Kaczkowski
Thesis Seminary	**30**	**3**	
Thesis Laboratory	**60**	**4**	
TOTAL	**258**	**30**	

SECOND YEAR

SEMESTER 1	Hours	ECTS	Lecturer
13. International Water Resources Law	**8** (8 lecture)	**1**	Dr M. Michalak
14. Environmental GIS	**24** (10 lec, 14 lab)	**3**	Dr M. Stolarska
15. Bioindicators	**24** (10 lec, 14 lab)	**3**	Dr hab. Z. Romanowska
16. Eutrofication Symptoms Control	**24** (10 lec, 14 lab)	**3**	Dr A. Bednarek
17. Watershed Pollution Control	**24** (10 lec, 14 lab)	**3**	Dr M. Urbaniak
18. Hydroacustic in Fisheries & Ecology	**26** (10 lec, 16 lab)	**4**	Dr hab. M. Godlewska
19. Fish-based Assessment & River Restoration	**14** (8 lec, 6 lab)	**2**	Dr M. Łapińska
20. Long-term Ecological Research	**14** (8 lec, 6 lab)	**2**	Dr K. Krauze
Thesis Seminary	**30**	**4**	
Thesis Laboratory	**60**	**5**	
TOTAL	**246**	**30**	

SEMESTER 2	Hours	ECTS	Lecturer
21. Trophic Relationships in Reservoirs	**24** (10 lec, 14 lab)	**3**	Prof. P. Frankiewicz
Thesis Seminary	**30**	**3**	
Thesis Laboratory	**120**	**4**	
DIPLOMA WORK		**20**	
TOTAL	**174**	**30**	

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