

Summary of the Course Structure

SEMESTER 1 (at Tribhuvan University, Nepal; February – July)

30 ECTS = 250 marks

Paper	Name of the course	ECTS	Teachers
0	Introduction to the Programme	1	
	Practical information, the objective of the Master Programme, and study techniques. Basic concepts in philosophy of science in relation to the master thesis		
1	Biodiversity and Biogeography	8	
1.1	Biodiversity: pattern, processes and values		
1.2	Population, Community and Ecosystem dynamics		
1.3	Biogeography and Distribution of Biodiversity		
1.4	Agrobiodiversity & Food security		
2	Conservation Biology	7	
2.1	Threats to biodiversity		
2.2	Conservation approaches and strategies		
2.3	Conservation genetics		
2.4	Conservation planning and technical tools		
3	Mountain Environment and Human Ecology	7	
3.1	Mountains		
3.2	Mountain Environment		
3.3	Mountain resources		
3.4	Mountain Issues		
3.5	Human ecology		
4	Environment and Natural Resource Management	7	
4.1	Natural resources and sustainable management		
4.2	Environmental policies and laws		
4.3	Ethnobiology and conservation of indigenous knowledge		
4.5	Biodiversity, livelihood and (poverty reduction)/ Food security		

SEMESTER 2 (at University of Bergen, Bergen, Norway; Autumn)

30 ECTS = 250 marks

Paper		ECTS	
Compulsory			
BIO 303	Ordination and Gradient analyses	5	
BIO 300	Introduction to thesis writing	10	
GEO 308	Theory of science and research design	10	
Optional			
BIO 343	Alpine Ecology	5	
BIO 341	Biodiversity	5	

SEMESTER 3 & 4 (at Tribhuvan University, Nepal)

60 ECTS = 500 marks

Paper		ECTS	Time period
	Dissertation	60	
	Proposal writing		Feb.16-March 7
	Proposal presentation and approval		March 8-March 15
	Preparation for field work or laboratory work		March 16-April 7
	Field visit (not exceeding two months)		i. April-June ii. July-Sept
	Field report (First)		June
	Data analysis & Interpretation		June-September
	Data Presentation		October
	Thesis writing and defend		November

Appendix: Detail Course Structure of First Semester

Paper 0 INTRODUCTION TO THE PROGRAMME (1 ECTS)

Practical information, the objectives of the master programme, and study techniques. Basic concepts in philosophy of science in relation to the master thesis.

Paper 1. Biodiversity and Biogeography - 8 (8x3=24 lectures)

- 1.1 Biodiversity: patterns, processes and values:** (i) Introduction to biodiversity, components and levels of biodiversity, values of biodiversity (ecosystem, economic, aesthetic and social). (ii) Factors correlated with diversity, latitudinal gradients in species richness, species richness and productivity, diversity and sample area, diversity and disturbances. (iii) Inventory, assessments and mapping of biodiversity, introduction to gradient analysis and other quantitative methods. **(1+2+3 lectures)**
- 1.2 Population, community and ecosystem dynamics:** (i) Demography and population dynamics, the regulation of populations, evolutionary dynamics, coexistence and niche. (ii) Structure of communities and ecosystems, species interactions and coevolution, linking populations, communities and ecosystems. (iii) Vegetation ecology (vegetation types, vegetation dynamics - succession and temporal changes, vegetation and ecosystem function, vegetation ecology and global change). (iv) Landscape ecology (introduction, key issues, landscape pattern, spatial heterogeneity). **(2+2+2+1 lectures)**
- 1.3 Biogeography and distribution of biodiversity:** (i) The science of biogeography (definition, philosophy and basic principles, relationship with other sciences), history of biogeography (age of exploration, biogeography in 19th and 20th century), Himalayan biogeography. (ii) Pattern and hypothesis of biogeography (case studies of endemism, invasions), global pattern of biodiversity distribution (individuals, populations), the geography of communities (distribution of communities in space and time, ter and retriast biomes), fundamental biogeographical processes (dispersal, immigration, speciation, extinction). (iii) Conservation biogeography and new frontiers (geographic variation in biodiversity – terrestrial gradients, endemism and hotspots of biodiversity), biogeography and global climate change, applied biogeography (designing nature reserves, corridors, landscapes). (iv) The biogeography of humanity (colonization of old world, exploration of the new world), lessons from biogeography of humanity. **(2+4+2+1 lectures)**
- 1.4 Agrobiodiversity:** (i) Definition, components and values, changing trends in agricultural development and biodiversity links; genetic erosion and increased vulnerability to insect pests and diseases, addressing root causes of agro-biodiversity loss; ecosystem services by agro-biodiversity. (ii) Sustainable agriculture, participatory tools and approaches to manage agro-biodiversity. **(1+1 lectures)**

Required readings

CIP-UPWARD (2003), Huston (1994), Krebs (1994), Lomolino *et al.* (2006), Rosenzweig (1995), WCMC (1992), Wiens and Moss (eds).

Further readings

Biber-Klemm and Coffier (2006), Brookefield (2001), Brookfield *et al.* (2003), Chase and Leibold (2003), Gauch (1982), Grime (1979), Hill *et al.* (2005), Partap and Sthapit (1998), HMGN/MFSC (2002), Silvertown (1987), Jarvis *et al.* (2000), Mani (1978), McCune and Grace (2002), McCune and Mefford (1999), Myers and Giller (eds.), (1988), Perlman and Adelson (1997), ter Braak and Smilauer (1998), Wilson (1988), Woodward (1996), Wu and Hobbs (2007)

Paper 2. Conservation Biology ----- 7 (7x3=21 lectures)

- 2.1 Introduction:** definition: a brief history of conservation biology; concept, scope and field of conservation biology; recent trends in conservation biology.
(1 lecture)
- 2.2 Threats to biodiversity conservation:** (i) major threats to biodiversity and their causes (overexploitation, invasive exotics, habitat fragmentation, habitat degradation, climate change, pollution); (ii) current patterns and processes of global endangerment and biodiversity extinction (extinction in geological time, current extinction rates, extinction processes, the biology of human-caused extinction, types of species most vulnerable to extinction), concepts and examples of rare, endemic, threatened and endangered species; (iii) threat assessments and priority setting (Robinowitch's classification; IUCN threat categories; CAMP method, rapid vulnerability assessments).
(1+1+1 lectures)
- 2.3 Conservation approaches and strategies:** (i) Introduction: traditional, conventional and community-based approaches; current practices (*in-situ* and *ex-situ* conservation); conservation policies and legislation (Nepalese case). (ii) Population approach: conservation biology of small populations; metapopulation concepts and conservation; approaches for population monitoring, prediction to resilience and conservation (population viability analysis; case studies: optimal harvesting and population management, pest control and management of biological invasion). (iii) Species approach: conservation through protected area systems; habitat management and conservation; conservation of spectacular species (rare, endangered, threatened and endemic species; conservation of species of medicinal values); surrogate species concept; ecological restoration and conservation (steps in designing and implementing ecological restorations; animal reintroduction). (iv) Ecosystem approach: ecosystem resilience; key elements, approaches and examples of ecosystem approach; adaptive management; conservation of cultural environment (examples of World Heritage Sites). (v) Landscape approach: challenges and opportunities, landscape-based models for conservation, wildlife corridors, trans-boundary conservation, integrated conservation and development. (vi) Ecoregion approach: concept, scope and scale; ecoregion conservation principles (with examples from HKH).
(2+2+3+2+1+1 lectures)
- 2.4 Conservation genetics:** (i) Genetic variation and analysis: variations within and among individuals and populations, genetic processes, forces that affect population genetic variation, the use of biochemical and molecular markers; threats to *in situ* genetic conservation; (ii) Using conservation genetics to inform management: identifying and prioritizing groups for conservation, genetic information and design and implementation of breeding strategies, domestication and *ex situ* genetic conservation; limitations of using genetics in conservation planning.
(2+1 lectures)
- 2.5 Conservation planning and technical tools:** (i) Conservation strategy, sustainability, biodiversity action plans (with practical –term paper); (ii) tools in conservation – GPS, GIS, remote sensing, ecological modeling, molecular tools (with practical).
(1+2 lectures)

Required readings

Faulk and Holsinger (1991), Groom *et al.* (2005), Perlman and Adelson (1997), Townsend (2007), WCMC (1992).

Further readings

AkÇakaya *et al.* (1999), Baillie *et al.* (2004), Briggs and Walters (1997), Caswell (2001), Domroes (2003), Gaston and Spicer (1998), Goodale *et al.* (2003), Hamilton and Hamilton (2006), HMGN/MFSC. (2002), Korner *et al.* (2005), Kothari *et al.* (1998), Pullin (2006), Shrestha and Joshi (1996), Soulé (1986), Western *et al.* (1994), Wiens and Moss (eds), Wikramanaake *et al.* (2003), Young *et al.* (2000)

Paper 3. Mountain Environment and Human Ecology 7 (7x3=21 lectures)

- 3.1 Mountains Introduction:** Dimension of the earth, Orogenesis, terminology, kinds, distribution, major ranges, altisystems, glaciers, the Himalayas, physical pattern.
- 3.2 Mountain and Altitudinal Change in Environment:** Geomorphology, characteristics of mountain environment, climate, hydrology, altitude effects, biological adaptations in mountains (plant, animals, man), techniques for altitude studies.
- 3.3 Mountain and Altitudinal Change in Resources Base:** Water, soil, biological, agricultural, minerals, tourism.
- 3.4 Mountain and Altitudinal Change in Human Land Use:** Depletion of biodiversity, environmental degradation, earthquakes hazards, global warming, globalization, conflicts, conservation and development.
- 3.5 Mountain and Human Ecology:** Demographic patterns, mountains and man in the Himalayas, human health, transhumance, cultural landscape, prospects for sustainable developments.

Required readings

RONAST (), Pandey (1995), Ives (2006), Singh and Singh (1987), Ives and Messerli (1989), Korner (2003), Mani (1974), Messerli and Ives ()

Further readings

Paper 4. Environment and Natural Resource Management 7 (7x3=21 lectures)

- 4.1 Natural resources and sustainable management:** (i) Theory and components; natural resource degradation in the 20th century; epistemology and framework for natural resource management; socio-economic, cultural, political and biological dimensions of resource sustainability. (ii) Opportunities and constraints on sustainable use of biodiversity (timber, medicinal plants, food plants and other NTFPs); participatory tools and approaches, alternatives to wild harvest; substitute species; eco-certification process and mechanism. (iii) Database management and information networking: principles and applications in biological resource documentation and management. **2+2+1 lectures**
- 4.2 Environmental policies and laws:** (i) Environment and biodiversity law from the perspectives of science and policy; biodiversity safety nets for saving endangered species. (ii) International laws, policies and conventions; international protection beyond human boundaries. (iii) Species-specific legislations: existing legislation that protects wild species, collection restrictions, trade restrictions; habitat-specific legislations: obligation to protect the habitat of protected species; protection of certain habitat types. (iv) National legislations: environment and biodiversity laws (Nepal and regional), acts, policies, regulations, action and implementation plans. **1+1+2+1 lectures**
- 4.3 Ethnobiology and conservation of indigenous knowledge:** (i) Ethnobiology: categories of ethnobiological classification; indigenous peoples' knowledge, traditional resource utilization patterns and management practices, community based institutions and their strengthening. (ii) Cultural and biological diversity: importance and utilization, documentation and conservation of indigenous knowledge. (iii) Integrating ethnobiological knowledge in participatory biodiversity assessment, conservation planning, and sustainable management. (iv) Intellectual Property Rights (IPRs): concept, types, modality; securing IPRs of indigenous peoples; farmers rights, various options of *sui generis* IPRs. **2+1+1+1 lectures**
- 4.4 Biodiversity, livelihood and poverty reduction:** (i) Economic value of resource use to rural households; resource markets; value addition processes, cost and benefit analysis; linking livelihood and cultural support and conservation. (ii) Community-based resource utilization and management practices; impact of biodiversity on human settlement and their culture. (iii) Domestication of high value – low volume biological resources. (iv) Biodiversity prospecting: concept, contracts, policies and benefit sharing. (v) Participatory survey of community and household economy; local biodiversity action plan for improving people's livelihood. **2+1+1+1+1 lectures**

Required readings

Berlin (1992), Groom *et al.* (2005), Grumbine (1994), Kate and Laird (2000), Klem (1990), Sayer and Campbell (2004)

Further readings

Allison and Hobbs (2006), Campbell and Luckert (2002), Cunningham (2001), Fisher (1991), Given (1994), Hamilton and Hamilton (2006), Laird (2002), Martin (1995), Peters (1994), Reid *et al.* (1993), Snape (1996), Tamang (1990), Wild and Mutebi (1996)

SEMESTER 2 (at University of Bergen, Norway) Autumn

Paper ECTS

Three compulsory advanced courses of total 25 ECTS,
and three different selective courses

GEO 306 Qualitative methods at 10 ECTS

Department of Geography; Professor Tor. H. Aase

BIO 300 Biological data analyses and experimental design 10 ECTS

Department of Biology; Ass. prof. K.A. Pittman

BIO 299 Research Project in biology 5 ECTS

Department of Biology

Individual project in relation to the thesis research:

Literature search and essay (Introduction to thesis)

Coordinator Ole R. Vetaas and supervisors from Tribhuvan university

Selective courses of 5 ECTS:

BIO 303 Ordination and Gradient Analyses 5 ECTS

Department of Biology; Professor John Birks

341 Biodiversity 5 ECTS

Department of Biology Ass. Prof. Lawrence Kirkendale

343 Mountain Ecology 5 ECTS

Department of Biology Ass. Prof. Torstein Solhøy

We aim to extend the BIO 343 with a demonstration of spatial elevation gradient, and do a similar demonstration in Nepal.

(1-2 ECTS)

SEMESTER 3 & 4 (at Tribhuvan University, Nepal)

Paper ECTS 60

DISSERTATION thesis

Proposal writing Feb.16-March 7

Proposal presentation and approval March 8-March 15

Preparation for field work or laboratory work March 16-April 7

Field visit (not exceeding two months)

1st field April-June

2nd field visit (if necessary) July-Sept

i. Field report (First) June

ii. Data analysis & Interpretation June-August

iii. Thesis writing September-November

iv Thesis submission December

v. Exam 1-2 months after submission

Note: ECTS - European Credit Transfer & accumulation System, has been introduced for the first time in Nepal. The main goal of ECTS is to promote the exchange of academic information among European institutions of higher education in order to facilitate student mobility. One ECTS credit represents between 24 and 30 hours; 60 credits represent the work load of one full-time study; 30 credits are given for a semester. One ECTS credit is comparable to one half (0.50) semester credit at a regionally accredited post-secondary institutions in the United States.