



SYLLABUS

Course name: URBAN ECOLOGY
 Number of credits: 3 ECTS/6 MCTS
 Period: Fall/Spring /Autumn semester

Host institution	Khovd State University, School of Natural Sciences and Technology
Lecturer	assoc prof. Amarjargal A. , assoc. prof. Unurnasan D.
Level	Master course
Course type	Major course
Course duration	16 weeks
New/Revised	A newly developed
E-course link	

Summary

This 3 ECTS course covers the topic of urban ecology, it will be flexible to allow for individual student exploration into topics of specific interest with regard to urban/urbanizing areas.

The course will investigate urban ecology using the proposed Syllabus. This is a project based course, co-designed by the students and instructor to cover a range of topics and themes in the field of urban ecology.

Target student audiences

Master students majoring in Ecology, Chemistry and Biology.

Prerequisites

Required courses (or equivalents):

Required courses	Ecological Research Methodology	ECMN-601
	Modern trends in natural science	NSC-601
Equivalent course	Ecological biochemistry	ECOL-815

Aims and objectives

The *aim of the course* is to train to ability to create nature-based solutions to support the development of sustainable environmental management strategies in cities.

Course objectives:

- To introduce the concepts and theories of ecology in urban context;
- To explain the principles and strategies for bio-diversity conservation and management for sustainable urban development;

- To impart the knowledge on evaluating the environmental and social impacts of urban development;
- Provide knowledge and skills to evaluate urban ecosystem services;
- Develop systematic thinking about the city. Introduce strategies dealing with global challenges of climate change in cities;

The authentic tasks

The course consists of 4 main parts. It includes:

- **Basic issues of urban ecology:** Human-nature relationship, urbanization and sustainable urban development, urban ecology, nature-based smart city
- **Urban ecosystem:** urban climate, urban air quality issues, urban hydrology and water quality issues, urban soil and soil pollution and ways to reduce it, urban plant and animal ecology, urban afforestation and forest protection issues
- **Urban Ecosystem Services:** Types of ecosystem services and their assessment, urban greening services, waste management and waste recycling methods, urban public health issues, urban landscape design and landscape in urban planning
- **Urban ecology and adaptation:** Ecosystem-based adaptation, urban planning and urban nature-based solutions.

General learning outcomes:

By the end of the course, successful students will:

Cognitive domain of Blooms taxonomy	Skill
Understand	<ul style="list-style-type: none"> • Understand the impact of urbanization on the environment; • Understand that man is a component of the urban ecosystem; • Explain how urbanization affects populations, communities, and ecosystems.
Apply	<ul style="list-style-type: none"> • Use of ecological research methodology to determine the components of the urban ecosystem.
Analyze	<ul style="list-style-type: none"> • Analyze how urbanization affects the physical, chemical, and biological properties of ecosystems.
Evaluate	<ul style="list-style-type: none"> • Analyze how urban areas affect local, regional and global patterns of biodiversity; • Assess urban ecosystem services.
Create	<ul style="list-style-type: none"> • Develop a project in framework of smart city planning with nature-based solutions. • Make recommendations improving urban ecology.

Overview of sessions and teaching methods

The following methods are used when organizing lessons. It includes:

- Lecture;

- Collaborative learning;
- Experimental research;
- Project-based learning;
- Problem-based learning.

Four quadrant approach of e-Learning

I	II
<p>e-Tutorial: Video and Audio Content in an organized form, Animation, Simulations, video demonstrations, Virtual Labs, etc, along with the transcription of the video.</p>	<p>e-Content: self instructional material, e-books, illustrations, case studies, presentations etc, web resources such as further references, related links, open source content on internet, video, case studies, books including e-books, research papers & journals, articles, etc.</p>
III	IV
<p>Discussion forum for raising of doubts and clarifying them on a near real time basis by the Course Coordinator or his team.</p>	<p>Assessment: Problems and solutions, which could be in the form of multiple choice questions, fill in the blanks, matching questions, short answer questions, long answer questions, quizzes, assignments and solutions.</p>

Course workload

The table below summarizes course workload distribution:

- ~ 32 in class hours:
 - 22 (15-20)teaching /lecture/
 - 10 (10-15) exercise /experiment/
- ~ 60 home activities:
 - 10 hours exercise, quiz
 - 20 hours self-study
 - 30 hours mini project

Grading

The students' performance will be based on the following:

Assessment	<p>Participation (20%): Participation in e-learning and in discussions</p> <p>Formative assessment (50%):</p> <p>~ Exercise (20%): students have to complete the quiz or exercise of each topic.</p> <p>~ Homework (20%): Development of the project proposal within the selected topic</p> <p>Final examination (30%) Test consisting of exercises and tasks in framework urban ecology content</p>				
	Evaluation EU system	A (8,5 – 10) B (7,0 – 8,4)	Evaluation MN system	95-100 90-94 85-89	A A- B

C (5,5 - 6,9)	80-84	B-	2.7
D (4,0 – 5,4)	75-79	C	2.3
	70-74	C-	1.9
	65-69	D	1.4
	60-64	D-	1.0
	0-59	F	0.0

Course schedule

Week	Basis topic	In-class hours	Content	Lecture	Exercise/ Experiment
I	Introduction to urban ecology	2	<ul style="list-style-type: none"> • Human and nature relationship, urbanization • Sustainable development of the city 	+	
II		2	<ul style="list-style-type: none"> • Problems of urban ecology • A smart city based on nature 	+	
III	Urban ecosystem	2	<ul style="list-style-type: none"> • Urban atmosphere • Urban air quality issues 	+	
IV		2	<ul style="list-style-type: none"> • Urban hydrology • Water quality issues 		+
V		2	<ul style="list-style-type: none"> • Urban soil • Soil pollution and ways to reduce it 		+
VI		2	<ul style="list-style-type: none"> • Urban flora and fauna • Flora and fauna ecology 	+	
VII		2	<ul style="list-style-type: none"> • Urban afforestation • Problems of urban forest protection 	+	
VIII		2	<ul style="list-style-type: none"> • Types of ecosystem services • Assessment of ecosystem services 	+	
IX	Urban Ecosystem Services	2	<ul style="list-style-type: none"> • Classification of urban green spaces • Green building services 		+
X		4	<ul style="list-style-type: none"> • Types of urban waste • Waste management of urban • Waste recycling methods 	+	
XI		2	<ul style="list-style-type: none"> • Urban public health issues • Human ecology • Effects of urban ecology on human health 	+	
XII		2	<ul style="list-style-type: none"> • Urban landscape design • Landscape in urban planning 		+
XIII		2	<ul style="list-style-type: none"> • Ecosystem services and urban planning 	+	
XIV		Urban ecology and adaptation	2	<ul style="list-style-type: none"> • Ecosystem-based adaptation 	+

XV		2	<ul style="list-style-type: none">• Green and blue city planning• Nature based urban solutions		+
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Literature

Compulsory:

1. Johannes Langemeyer. (2015). *Urban Ecosystem Services*.
2. Яргункина Н. Ю. (2014). *Экология города*.
3. Довчиндорж Г., Мөнхболд Д., Ариунжаргал Г. (2013). *Хотын экологи*

Recommended:

1. Thomas Elmqvist, M. F. (2013). *Urbanization, Biodiversity and Ecosystem Services*.: Springer.
2. Вершинин В. Л. (2014). *Экология города*
3. Басыйров А.М. (2013). *Экология города*
4. Галт Л. (2019). *Хүрээлэн буй орчны микробиологи*