**Course Name: Urban Ecology and Environment**

**Number of credits: 3 ECTS**

**Period: Spring semester**

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| Coordinator | **Dr. Shah Murtaza Mushtaq** |
| Credits | 3 (2+1) ECTS |
| Lecturers | **Dr. Shah Murtaza Mushtaq, Dr. Akhlaq Amin Wani, Dr. Aasif Ali Gatoo, Dr. M. A. Islam** |
| Level | Postgraduate |
| Host institution | Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) |
| Course duration | 18 Weeks |

**Summary**

This is a 4 ECTS course which is provided as Optional (Major) course to Master of Science Forestry (Forest Resource Management) students. The course introduces the basics of Urban ecosystem, cause and effects of urbanization, adaptive and resilient urban development, climate and related risks and strategic developmental management.

**Target student audiences**

Master of Science Forestry (Forest Resource Management) students

**Prerequisites**

The student must have understanding of basic concepts of ecology.

**Aims and objectives**

The course prepares students for careers as leaders in understanding urban ecology, biodiversity conservation and management for sustainable development. It prepares the students to evaluate environmental and social impacts to deal with global challenges of climate change in cites.

**General learning outcomes:**

On completion of this course, the students would:

* Gain a wider understanding of urban ecological and environmental issues ranging from biodiversity to climate resilience and appreciate potential approaches for cities to deal with ecological and environmental challenges and threats of climate change.
* Enhance abilities and skills relating to evaluation of environmental and social impacts of urban development.

**Overview of sessions and teaching methods**

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| **Unit** | **Syllabus** |
| **Unit 1:**  | * Concepts of urban ecology:
* Theories of urban ecology and linkages with sustainable urbanism
* Concepts of Eco cities, smart cities, compact cities etc.
* Challenges and opportunities of urban, rural and peri-urban growth.
 |
| **Unit 2:**  | Green Spaces, bio-diversity conservation and conflicts:* Urban greens: challenges and choices for management
* Human nature interactions and urban forest management
* introduction to functional diversity and traits
* Bio-diversity conservation conflicts
* Spatial dimensions of urban ecology
 |
| **Unit 3:**  | Urban Environment: * Introduction to urban morphology
* Industrial ecology and symbiosis
* Management of air quality and noise
* Urban solid waste management
* Urban water ecological challenges.
 |
| **Unit 4:**  | Impact Analysis and Ecological Footprint Analysis:* Environmental Impact Analysis 10 2
* Social Impact Analysis and Strategic Environmental Assessment
* Urban metabolism and Ecological Footprint Analysis.
 |
| **Unit 5:**  | * Ecological risk assessment framework (Definition, Problem formulation, Risk analysis, Risk characterization, Risk management).
* Climate change, mitigation and adaptation
* Climate modifications and managing climate change challenges in cities
* Adaptation and mitigation measures to make cities resilient.
* Ecosystem services and nature-based solution to address urban resilience
 |
| **Practical** | Vegetation analysis and characterization of green spaces in nearby urban areas. Identifying challenges in soil waste management in nearby urban areas. Urban Risk assessment and mitigation in urban areas.  |
| **Individual Assignment** | Case studies with brief report and presentation regarding * Ecosystem Services
* Heat Island Effect
* Air/Water/Noise Pollution
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| **Group Assignment** | Group survey for case studies in nearby cities and small towns regarding:* Ecosystem services and soil condition
* Urban allotment gardens-peoples motivation and practices
* Permaculture as a potential tool for sustainable food production
* Urban solid waste management
 |
| **Self Study** | Understanding the basic and modelling of urban ecosystems on provided teaching materials and related literature |

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| **Learning methods** | * In class lecture
* Online tutorials
* Lab/Field exercises
* Project-Based Learning
* Individual Assignments
* Group Assignments
* Presentations
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**Course outline**

|  |  |
| --- | --- |
|  | **UNIT 1** |
| **Week1** | * Concepts of urban ecology:
 |
|  | * Theories of urban ecology and linkages with sustainable urbanism
 |
| **Week2** | * Concepts of Eco cities, smart cities, compact cities etc.
 |
|  | * Challenges and opportunities of urban, rural and peri-urban growth.
 |
|  | **Practical:** Vegetation analysis and characterization of green spaces in nearby urban areas..  |
|  | **UNIT 2** |
| **Week3** | Green Spaces, bio-diversity conservation and conflicts:* Urban greens: challenges and choices for management
 |
|  | * Human nature interactions and urban forest management
 |
| **Week4** | * introduction to functional diversity and traits
 |
|  | * Bio-diversity conservation conflicts
 |
| **Week5** | * Spatial dimensions of urban ecology
 |
|  | **Practical:** Identifying challenges in soil waste management in nearby urban areas.  |
|  | **Mid Term Exam** |
|  | **UNIT 3** |
| **Week6** | Urban Environment: * Introduction to urban morphology
 |
| **Week7** | * Industrial ecology and symbiosis
 |
| **Week8** | * Management of air quality and noise
 |
| **Week9** | * Urban solid waste management
 |
| **Week10** | * Urban water ecological challenges.
 |
|  | **Practical:** Urban Risk assessment and mitigation in urban areas |
|  | **UNIT 4** |
| **Week11** | Impact Analysis and Ecological Footprint Analysis:* Environmental Impact Analysis 10 2
 |
| **Week12** | * Social Impact Analysis and Strategic Environmental Assessment
 |
| **Week13** | * Urban metabolism and Ecological Footprint Analysis.
 |
|  | **UNIT 5** |
| **Week14** | * Ecological risk assessment framework (Definition, Problem formulation, Risk analysis, Risk characterization, Risk management).
 |
| **Week15** | * Climate change, mitigation and adaptation
 |
| **Week16** | * Climate modifications and managing climate change challenges in cities
 |
| **Week17** | * Adaptation and mitigation measures to make cities resilient.
 |
|  | * Ecosystem services and nature-based solution to address urban resilience
 |
| **Week18** | **Practical Exam/Assignment submission/Presentation** |
|  | **End Tem Exam** |

**Literature**

**Compulsory**

K Sivaramakrishnan, & Rademacher, A. (2013). Ecologies of Urbanism in India Metropolitan Civility and Sustainability. Hong Kong China: Hong Kong University Press, Baltimore

Parris, K. M. (2016). Ecology of urban environments. Chichester, West Sussex ; Hoboken, Nj: John Wiley & Sons Ltd

Keitaro Ito (2021). Urban biodiversity and ecological design for sustainable cities. Springer

**Recommended**

Mostafavi M. and Doherty G. (2010) Ecological urbanism, published by Baden: Harvard University Graduate School of Design.

Dale R. (2004) Evaluating Development Programme and Project, Second Edition, Sage Publication.

Morrison-Saunders A. and Arts J. (2004) (eds.) Assessing Impact: Handbook of EIA and SEA Follow-up, Earthscan James & James, London.

The World Bank (2009) Strategic Environmental Assessment in East and Southeast Asia, A Progressive and Comparison Country Systems and Cases, Washington D.C.

WWF India (2011) Impact of urbanization on bio-diversity: Case Studies From India

United Nations Human Settlements Programme (UN-HABITAT) (2011) Global report on human settlements - Cities and Climate Change: Policy Directions

Singhal, S. and Kapur, A. 2002. Industrial Estate Planning and Management in India – an Integrated Approach towards Industrial Ecology. Journal of Environmental Management, Elsevier Science Ltd., 66, 2002.

Cities and Bio-diversity Outlook (2013) Action and Policy: A Global Assessment of the Links between Urbanization, Biodiversity, and Ecosystem Services, by Secretariat of the Convention on Biological Diversity.

Adler, F. R., & Tanner, C. J. (2013). Urban Ecosystems. Cambridge University Press

**Course workload**

The table below summarizes course workload distribution:

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| --- | --- | --- | --- |
| **Activities** | **Learning outcomes** | **Assessment** | **Estimated workload (hours)** |
| **In-class activities (32 hours)** |
| Lectures  | Understanding theories, concepts, methodology and tools in Urban ecology and environment.  | Class participation | 16 |
| Moderated in-class discussions | Understanding various policy and management contexts and common problems in communication in Urban ecology and environment.  | Class participation and preparedness for discussions | 05 |
| Reading and discussion of assigned papers for seminars and preparation for lectures | Familiarity with and ability to critically and creatively discuss key concepts, tools and methods as presented in the literature | Class participation, creative and active contribution to the discussion | 05 |
| Group presentation | Ability to interpret data, to analyze the audience, and use the concepts, tools to understand Urban ecology and environment.  | Quality of group assignments and individual presentations | 06 |
| **Practical (Lab and Field) (32 hours)** |
| Practical | Ability to perform lab experiments and use field based equipment after demonstration of tools and procedures by the instructor.  | Class/Field participation for data generation and preparedness for field project works | 32 |
| **Independent work (53 hours)** |
| Self-Study | Familiarity with and ability to critically and creatively discuss key concepts, tools and methods as presented in the literature |  | 25 |
| Individual Assignment/Presentation | Ability to individually interpret data, analyze the audience, and use the concepts, and tools, to understand Urban ecology and environment.  |  | 12 |
| Group Assignment/Presentation | Ability to interpret data, analyze the audience, and use the concepts, and tools, to understand Urban ecology and environment.  | Quality of group assignments and individual presentations | 16 |
| ***Total*** |  |  | ***115 Hours*** |

**Grading**

The students’ performance will be based on the following:

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| --- | --- |
| **Mode of assessment** | **% of marks** |
| Quiz 1 | 5 |
| Mid Term (Objective and Written) | 20 |
| Practical/Assignments (Discussion) | 25 |
| Quiz 2 | 5 |
| End Term (Objective and Written) | 45 |
| **Total** | **100** |

**Evaluation**

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| --- | --- |
| **% secured** | **Grade** |
| <55% | Fail |
| 55% and above | Pass |