**Course Name: Urban Ecosystem Management**

**Number of credits: 3 ECTS**

**Period: Spring semester**

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| Coordinator | **Dr. M. A. Islam** |
| Credits | 3 (2+1) ECTS |
| Lecturers | **Dr. M. A. Islam, Dr. Shah Murtaza Mushtaq, Dr. Akhlaq Amin Wani, Dr. Aasif Ali Gatoo** |
| Level | Doctoral |
| 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**

PhD (Forest Resource Management) students

**Prerequisites**

Basic knowledge on urban ecology.

**Aims and objectives**

The course prepares students for careers as leaders in understanding concept and management of complex and dynamic urban ecosystem.

**General learning outcomes:**

On completion of this course, the students would:

* Learn about fundamental concepts and processes associated with urban and peri-urban environments.
* Learn and experience the concepts of vulnerability, exposure, mitigation, adaptation, resilience and Urban Climate Change.
* Develop an understanding of establishment and maintenance of urban green infra-structure.
* Understand strategic management dimensions and policy strategy framework for urban resilience

**Overview of sessions and teaching methods**

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| **Unit** | **Syllabus** |
| **Unit 1:**  | Understanding Urban Ecosystem: Fundamental concepts and processes associated with urban and peri-urban environments. Urban sprawl – Challenges and need for resilience:Urbanization – trends, causes, effects, and requirements of urban and peri-urban climatic resilience and adaptation.  |
| **Unit 2:**  | Contexts of adaptive and resilient urban and peri-urban development**:** Adaptive development needs, scope and opportunities in urban and peri-urban systems management.Urban and peri-urban water, temperature, winds, and health risks**:** Key dimensions of climate and extreme events, related disaster risks and vulnerability in an urban and peri-urban context.  |
| **Unit 3:**  | Green infrastructure (GI): Concept, elements, Role of GI in protecting ecosystem and biodiversity. Green Infrastructure management:Establishment and maintenance of trees as beneficial components of urban environments. Tree functionality (biological, social, environmental and economic opportunities and constraints). Management of trees and wooded areas within ecological urban and peri-urban landscapes. |
| **Unit 4:**  | Strategic management of risks with green growth and ecosystems: Strategic management framework addressing sustainable and resilient urban development. Policy-planning-practice linkages: Role of planning, urban and peri-urban ecosystem and green growth strategies.  |
| **Practical** | Practical exercise to assess spatial and temporal urban sprawl in the nearby urban and peri-urban areas. Field exercise to assess factors responsible for urban sprawl. Characterizing green infrastructure in the nearby urban and peri-urban areas.  |
| **Individual Assignment** | * Case examples from nearby cities/towns Case examples including different size/ categories of cities, geographies, sectoral or vulnerability contexts.
* Poster on dimensions and contexts of urban climate resilience.
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| **Group Assignment** | * Field survey and transect walk should be carried out across the urban and peri-urban sites to identify and explain the relationships among urban and peri-urban area- its natural vegetation, cultivation, human activities and settlement pattern and Community Based Disaster Risk Reduction (CBDRR).
* Group exercise and presentation on developing possible causal-loop (tool) scenarios for climate and disaster risks and resilience in urban and peri-urban settings regarding hazards, sectors and specific impacts.
* Studying components of vulnerability i.e. exposure, sensitivity & adaptive capacity in the context of urban risks.
* Policy-planning-practice linkages with suitable examples.
* Experience sharing through power point presentation, report and discussion.
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| **Self Study** | Understanding the basic and modelling of urban ecosystems management 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**

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|  | **UNIT 1** |
| **Week1&2** | Understanding Urban Ecosystem: Fundamental concepts and processes associated with urban and peri-urban environments.  |
| **Week3&4** | Urban sprawl – Challenges and need for resilience:Urbanization – trends, causes, effects, and requirements of urban and peri-urban climatic resilience and adaptation. |
|  | **Practical:** Practical exercise to assess spatial and temporal urban sprawl in the nearby urban and peri-urban areas.  |
|  | **UNIT 2** |
| **Week5** | Contexts of adaptive and resilient urban and peri-urban development**:** Adaptive development needs,  |
| **Week6** | scope and opportunities in urban and peri-urban systems management. |
| **Week7&8** | Urban and peri-urban water, temperature, winds, and health risks**:** Key dimensions of climate and extreme events, related disaster risks and vulnerability in an urban and peri-urban context.  |
|  | **Practical:** Field exercise to assess factors responsible for urban sprawl.  |
|  | **Mid Term Exam** |
|  | **UNIT 3** |
| **Week9** | Green infrastructure (GI): Concept, elements,.  |
| **Week10** | Role of GI in protecting ecosystem and biodiversity |
| **Week11** | Green Infrastructure management:Establishment and maintenance of trees as beneficial components of urban environments.  |
| **Week12** | Tree functionality (biological, social, environmental and economic opportunities and constraints).  |
| **Week13** | Management of trees and wooded areas within ecological urban and peri-urban landscapes. |
| **Week14** |  |
|  | **Practical:** Characterizing green infrastructure in the nearby urban and peri-urban areas.  |
|  | **UNIT 4** |
| **Week15** | Strategic management of risks with green growth and ecosystems: Strategic management framework addressing sustainable and resilient urban development.  |
| **Week16** | Policy-planning-practice linkages: Role of planning,  |
| **Week17** | Urban and peri-urban ecosystem and green growth strategies. |
| **Week18** | **Practical Exam/Assignment submission/Presentation** |
|  | **End Tem Exam** |

**Literature**

**Compulsory**

Elmqvist et al. (2013). Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities. SpringerLink. https://doi.org/10.1007-978-94-007-7088-1

Blue-Green Infrastructure Across Asian Countries. (2022). SpringerLink. <https://doi.org/10.1007-978-981-16-7128-9>

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

Gupta, A. K., S S Singh, S A Wajih, N. Mani and A.K. Singh, 2017. Urban Resilience and Sustainability through Peri-urban Ecosystems. GEAG, ACCRN & Rockefeller Foundation.

**Recommended**

“City Resilience Framework” ARUP, December 2015, Available at https://assets.rockefellerfoundation.org/app/ uploads/20140410162455/City-Resilience-Framework-2015.pdf

Cities, Towns, Regions Partner to Help Achieve Paris Goals”, Article, UNFCCCC, 10 November 2016, available at

Making our cities smart and resilient”, Raina Singh, 3 March 2018, available at [www.teriin.org/article/making-our-cities-smart-and-resilient](http://www.teriin.org/article/making-our-cities-smart-and-resilient).

**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 ecosystem management.  | Class participation | 16 |
| Moderated in-class discussions | Understanding various policy and management contexts and common problems in communication in Urban ecosystem management.  | 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 ecosystem management.  | 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 ecosystem management.  |  | 12 |
| Group Assignment/Presentation | Ability to interpret data, analyze the audience, and use the concepts, and tools, to understand Urban ecosystem management.  | 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 |