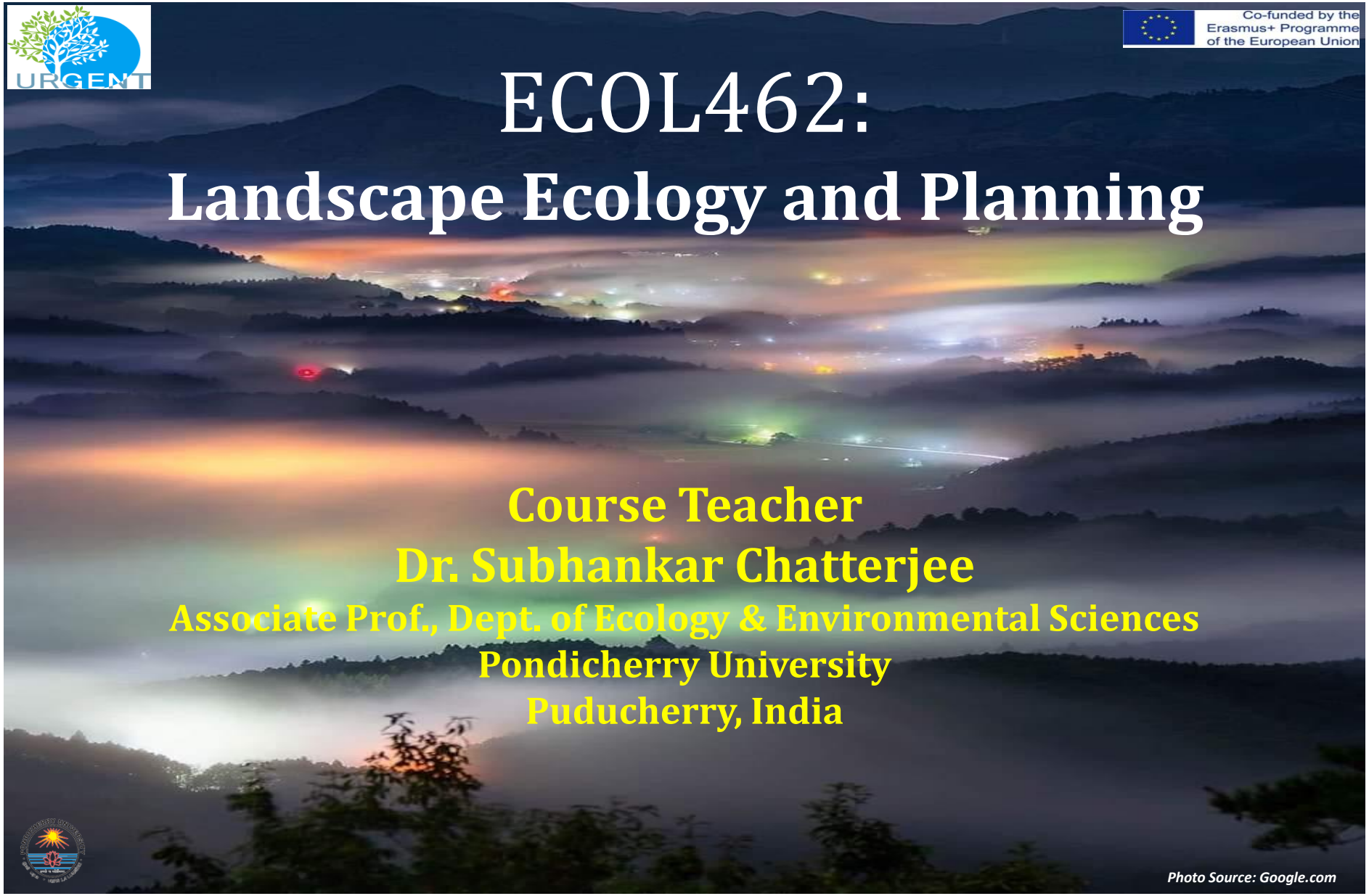

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Content

1. Course description
2. Course goal
3. Course outcome
4. Course structure
5. Course Assignment
6. Reading materials
7. Videos

Course Title	:	Landscape Ecology and Planning
Number of Credits	:	3.0 ECTS
Course duration	:	18 Weeks
Level	:	Postgraduate
Prerequisite	:	Required courses (or equivalents): No prerequisite courses are required although a basic understanding of ecology and environmental sciences (high school/graduate level) will be an added advantage. Strong English language skill (verbal and writing) is essential. Supplementary reading and writing courses may be advisable for students with English as a second language. Basic computer operation (Windows/Mac) knowledge is necessary for lab-related activities.

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Course description

Ecology is a broad scientific discipline that focuses on interactions, most typically involving organisms. Landscape ecology is the study of the causes of environmental patterns and the consequences of spatial heterogeneity and patterns on ecological processes. Landscape ecology provides concepts, theories, and methods that emphasize the importance of spatial patterning on the dynamics of interacting ecosystems, how to characterize the patterning, and how it might change through time. In studying landscape ecology, one will understand the dominant themes of the field, familiarize with its current research trends, and explore applications of the landscape approach. The course should be useful to students in ecology and natural resources as well as conservation biology, landscape architecture, geography, land use planning, and other related fields. As a discipline, it provides us with a new way of viewing and investigating ecological systems. Diverse aspects of spatial patterning, its causes, development, and importance for ecological processes will be taught in this course so that students can independently apply the knowledge of landscape ecology for both management and conservation purposes.

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Course goals

The main course objective is to make the students in-depth understanding of the concepts and salient features of Landscape ecology. Students will get an overview of the field along with current concepts, methods, and applications of landscape ecology. With hands-on training on quantitative tools of landscape ecology, field-related projects and reading writing assignments will enable students to develop or apply these tools and concepts in their studies and/or research.

Learning methods

- In class Lectures (face-to-face)
- E-learning materials – Video lectures
- Literature review and assignment submission: reading and discussion of literature reflecting state-of-the-art research in the field and preparation of assignment based on this.
- Hands-on exercises designed to provide experience with some of the quantitative tools of landscape ecology
- One minor project – Fieldtrip, data collection, analysis, and report presentation

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Course outcome

By the end of the course, successful students will:

1. Understand the current concepts of landscape ecology and the scale, scaling techniques, and spatial patterns.
2. Explain how ecological systems are dynamic in space and time
3. Infer the abiotic and biotic processes that structure landscape mosaics and patterns of biodiversity at multiple spatial scales;
4. Explain the basis of spatial pattern analysis using continuous and categorical spatial data;
5. Use standard software packages and the tools specific to landscape ecology, run and interpret the results of simple landscape models to answer questions about heterogeneity, scale, and ecosystem dynamics.
6. Review the theory, methodology, and application of landscape ecology to contemporary issues in conservation biology and resource management;
7. Conduct independent research in landscape ecology, including proposal writing, implementation, oral/poster presentation, and written manuscripts/popular articles.

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Course structure

Week -1	Introduction of the course: General overview of Landscape ecology and planning
	Scope of landscape ecology: Definitions and Scale
	Land and Landscape processes
Week -2	Hierarchy: ecosystems to land units;
	Ecological principles at work with Landscapes
	Lab 1: Creating landscape pattern
Week -3	From Ecosystem ecology to Landscape Ecology
	Exam-1 (UNIT-I)
Week-4	Spatial Heterogeneity and Landscape
	History of Landscape Ecology
Week-5	Concept of Scale and technological advances;
	Patch – Corridor – Matrix model
	Lab 2: Using neutral landscape models
Week-6	Disturbance, remnant, environmental, and introduced patches.
	Exam-2 (UNIT-II)
Week-7	**Assignment submission and presentation**
Week-8	Patches as Islands – Patch Size and Edge effect
	Habitat Fragmentation and Nonnative Species; Metapopulation Dynamics and Appropriate Management
Week-9	Understanding Landscape Structure Using Landscape Metrics – Composition, Shape, Configuration
	Lab 3: Understanding landscape metrics
	Lab 4: Understanding landscape metrics continued
Week-10	Spatial statistics – spatial independence, spatial structure, and spatial interpolation
	Lab 5: Scale detection using spatial stats
	Exam-3 (UNIT-III)
Week-11	Land Use/Cover Change; Ecosystem and biodiversity impacts
	Organisms and landscape pattern; Ecosystems processes on landscapes
	Lab 6: Spatial dynamics of ecosystem processes
Week-12	Inventory and Tools for wasteland assessment and evaluation
	Land Reclamation and Restoration
	Natural hazard mitigation/erosion
Week-13	Concept of ecological land degradation – desertification, deforestation, waterlogging, salinization, and soil erosion
	Exam-4 (UNIT-IV)
Week-14	**Assignment submission and presentation**
Week-15	Landscape ecology Practices in Planning: Landscape Connectivity and Urban Networks – Parks, greenbelts, and greenways/green infrastructure
	Lab 7: Assessing multi-scale landscape connectivity
Week-16	Designing Landscapes and Urban Sustainability.
Week-17	Field Report – Participatory Sketch Mapping of Landscape Features
	Exam-5 (UNIT-V)
Week-18	**Assignment submission and presentation**

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Mode of delivery

Lectures and in-class discussion

Students will be able to

- understand the current concepts of landscape ecology scale, scaling techniques, and spatial pattern;
- explain how ecological systems are dynamic in space and time;
- infer the abiotic and biotic processes that structure landscape mosaics and patterns of biodiversity at multiple spatial scales;
- explain the basis of spatial pattern analysis using continuous and categorical spatial data.

Lab work and in-class participation

- Students will be able to use standard software packages and the tools specific to landscape ecology, run and interpret the results of simple landscape models to answer questions about heterogeneity, scale, and ecosystem dynamics
- Reading assignments and discussion of assigned papers(All the students are expected to have read the assignment before class and given thought to the paper's content and context).
- Review the theory, methodology, and application of landscape ecology to contemporary issues in conservation biology and resource management.

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Assignment submission and presentation

Week-7	**Assignment 1: Submission and presentation**
Land and Landscape processes; Ecological principles at work with Landscapes; Spatial Heterogeneity and Landscape; Concept of Scale and technological advances; Patch – Corridor – Matrix model **(Either GroupWise or individual)**	
Week-14	**Assignment 2: Submission and presentation**
Metapopulation Dynamics and Appropriate Management; Understanding Landscape Structure Using Landscape Metrics – Composition, Shape, Configuration; Spatial statistics; Organisms and landscape pattern; Ecosystems processes on landscapes; Natural hazard mitigation/erosion; Concept of ecological land degradation – desertification, deforestation, water logging, Stalinization and soil erosion **(Either GroupWise or individual)**	
Week-18	**Assignment 3: Submission and presentation**
Landscape ecology Practices in Planning: Landscape Connectivity and Urban Networks – Parks, greenbelts and greenways/green infrastructure; Designing Landscapes and Urban Sustainability **(Either GroupWise or individual)**	

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Reading:

•Turner MG Gardner, RH, 2015. Landscape Ecology in Theory and Practice, 2nd Edition, Springer Nature.

•Lopez, RD, Frohn, RC, 2017. Remote Sensing for Landscape Ecology: New Metric Indicators CRC Press; 2 edition

•Forman RTT, and M Godron.1986. Landscape ecology. Wiley, New York.

•Risser PG, JR Karr, and RTT Forman.1984. Landscape ecology: directions and approaches. Special Publ. No. 2, I11. Natural Hist. Surv., Champaign.

•Turner MG.1989. Landscape ecology: the effect of pattern on process. Ann. Rev. Ecol. Syst. 20:171-197.

•Turner MG.2005. Landscape ecology: what is the state of the science? Annu. Rev. Ecol. Evol. Syst. 36:319-44.

•Forman RTT.1995. Land mosaics: the ecology of landscapes and regions. Cambridge University Press, Cambridge, England

Reading Materials:

Reading materials will be uploaded in the google classroom. Open access books, review, latest publications and lecture materials will be provided.

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Videos:

Videos/video lectures will be uploaded related to each unit/topic as required

Few Links for the videos:

https://www.youtube.com/watch?v=DUTR7EEIugs; https://www.youtube.com/watch?v=dB38Zz_X6pA

https://www.youtube.com/watch?v=h1J46foOW4s; https://www.youtube.com/watch?v=eJzAwlhgNss

https://www.youtube.com/watch?v=30l6cTHhjVg; https://www.youtube.com/watch?v=DlQQU-2rnns

https://www.youtube.com/watch?v=kxCzWQnJfmE; https://www.youtube.com/watch?v=KVFIC6YVJkM

https://www.youtube.com/watch?v=6sFXsFfs368;