

Debre Tabor University
Faculty of Natural and computational Sciences
Department of Biology

Course syllabus for MSc Biology (Botany) Second Semester 2018/19 (2011 EC) Entry

Advanced Plant Ecology (Biol. 613) 3 Cr. Hrs. (7 ECTS)

Course Description

The course deals with ecological data (types, collection, analysis and interpretation), life forms and their application in plant strategies and vegetation processes, plant populations and communities, vegetation organization, vegetation development, ecosystem organization, types of ecosystems/natural resources, vegetation mapping, and applications of plant ecology.

Course Objectives

After completing this course, students will be able to:

- ✓ Identify ecological variables and data;
- ✓ Describe life forms;
- ✓ Describe the characteristics of plant populations and communities;
- ✓ Understand ecosystem structure and function and vegetation development;
- ✓ Distinguish the types of ecosystems/natural resources and their environmental and human importance;
- ✓ Apply ecological knowledge in many areas.

Course Content Breakdown

Unit 1. Ecological Data: Ecological variables and data; data collection, analysis and interpretation

Unit 2. Life Forms: Types, their application in plant strategies and vegetation processes

Unit 3. Vegetation organization: Concepts of population and community and continuum, analysis of communities (analytical and synthetic characters), community coefficients, classification and ordination; interspecific associations, concept of habitat and ecological niche

Unit 4. Vegetation development: Mechanism of ecological succession (relay floristics and initial floristic composition; facilitation, tolerance and inhibition models), changes in ecosystem properties during succession

Unit 5. Ecosystem organization: Structure and functions; primary production (methods of measurement, global pattern, controlling factors); energy dynamics (trophic organization, concept of energy flow, energy flow pathways, ecological efficiencies); litter fall and decomposition

(mechanism, substrate quality and climatic factors); global biogeochemical cycles of C, N, P and S; mineral cycles (pathways, processes, budgets) in terrestrial and aquatic ecosystems

Unit 6. Ecosystems/Natural Resources: Types, environmental and human importance.

Unit 7. Applications of Plant Ecology

Practical Activities:

1. To compare the chemical characteristics of the soil samples collected from varied habitats.
 - a) Moisture level
 - b) Carbonate content
 - c) Nitrate content
 - d) pH value
2. To calculate the amount of total solid, suspended solid and dissolved solid particles from different water samples.
3. To study the distribution of different tree species in the natural and artificial forests.
4. To study the community by determining:
 - a) Frequency
 - b) Abundance
 - c) Density
 - d) (all by quadrat method)
5. To determine the biomass of producers in the given area.

Mode of Delivery

- ✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

Assessment Criteria

Continuous assessment will be implemented in assessing student's performance. The details of assessment breakdown are given below.

Assignments	15%
Mid exam	15%
Lab report	15%
Field trip report and presentation.....	15%
Final exam	40%
Total.....	100%

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 - d) (all by quadrat method)
5. To determine the biomass of producers in the given area.

Mode of Delivery

- ✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

Assessment Criteria

Continuous assessment will be implemented in assessing student's performance. The details of assessment breakdown are given below.

Assignments	15%
Mid exam	15%
Lab report	15%
Field trip report and presentation.....	15%
Final exam	40%
Total.....	100%

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Debre Tabor University
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Department of Biology

Course syllabus for MSc Biology (Botany) First Semester 2018/19 (2011 EC) Entry

Advanced Plant Ecology (Biol. 615) 3 Cr. Hrs. (7 ECTS)

Course Description

The course deals with ecological data (types, collection, analysis and interpretation), life forms and their application in plant strategies and vegetation processes, plant populations and communities, vegetation organization, vegetation development, ecosystem organization, types of ecosystems/natural resources, vegetation mapping, and applications of plant ecology.

Course Objectives

After completing this course, students will be able to:

- ✓ Identify ecological variables and data;
- ✓ Describe life forms;
- ✓ Describe the characteristics of plant populations and communities;
- ✓ Understand ecosystem structure and function and vegetation development;
- ✓ Distinguish the types of ecosystems/natural resources and their environmental and human importance;
- ✓ Apply ecological knowledge in many areas.

Course Content Breakdown

Unit 1. Ecological Data: Ecological variables and data; data collection, analysis and interpretation

Unit 2. Life Forms: Types, their application in plant strategies and vegetation processes

Unit 3. Vegetation organization: Concepts of population and community and continuum, analysis of communities (analytical and synthetic characters), community coefficients, classification and ordination; interspecific associations, concept of habitat and ecological niche

Unit 4. Vegetation development: Mechanism of ecological succession (relay floristics and initial floristic composition; facilitation, tolerance and inhibition models), changes in ecosystem properties during succession

Unit 5. Ecosystem organization: Structure and functions; primary production (methods of measurement, global pattern, controlling factors); energy dynamics (trophic organization, concept of energy flow, energy flow pathways, ecological efficiencies); litter fall and decomposition

(mechanism, substrate quality and climatic factors); global biogeochemical cycles of C, N, P and S; mineral cycles (pathways, processes, budgets) in terrestrial and aquatic ecosystems

Unit 6. Ecosystems/Natural Resources: Types, environmental and human importance.

Unit 7. Applications of Plant Ecology

Practical Activities:

1. To compare the chemical characteristics of the soil samples collected from varied habitats.

a) Moisture level

b) Carbonate content

c) Nitrate content

d) pH value

2. To calculate the amount of total solid, suspended solid and dissolved solid particles from different water samples.

3. To study the distribution of different tree species in the natural and artificial forests.

4. To study the community by determining:

a) Frequency

b) Abundance

c) Density

d) (all by quadrat method)

5. To determine the biomass of producers in the given area.

Mode of Delivery

✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

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✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

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Mode of Delivery

✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

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Advanced Plant Ecology (Biol. 615) 3 Cr. Hrs. (7 ECTS)

Course Description

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Unit 6. Ecosystems/Natural Resources: Types, environmental and human importance.

Unit 7. Applications of Plant Ecology

Practical Activities:

1. To compare the chemical characteristics of the soil samples collected from varied habitats.

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- d) (all by quadrat method)

5. To determine the biomass of producers in the given area.

Mode of Delivery

- ✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

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Advanced Plant Ecology (Biol. 615) 3 Cr. Hrs. (7 ECTS)

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Practical Activities:

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5. To determine the biomass of producers in the given area.

Mode of Delivery

✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

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Course Objectives

After completing this course, students will be able to:

- ✓ Identify ecological variables and data;
- ✓ Describe life forms;
- ✓ Describe the characteristics of plant populations and communities;
- ✓ Understand ecosystem structure and function and vegetation development;
- ✓ Distinguish the types of ecosystems/natural resources and their environmental and human importance;
- ✓ Apply ecological knowledge in many areas.

Course Content Breakdown

Unit 1. Ecological Data: Ecological variables and data; data collection, analysis and interpretation

Unit 2. Life Forms: Types, their application in plant strategies and vegetation processes

Unit 3. Vegetation organization: Concepts of population and community and continuum, analysis of communities (analytical and synthetic characters), community coefficients, classification and ordination; interspecific associations, concept of habitat and ecological niche

Unit 4. Vegetation development: Mechanism of ecological succession (relay floristics and initial floristic composition; facilitation, tolerance and inhibition models), changes in ecosystem properties during succession

Unit 5. Ecosystem organization: Structure and functions; primary production (methods of measurement, global pattern, controlling factors); energy dynamics (trophic organization, concept of energy flow, energy flow pathways, ecological efficiencies); litter fall and decomposition

(mechanism, substrate quality and climatic factors); global biogeochemical cycles of C, N, P and S; mineral cycles (pathways, processes, budgets) in terrestrial and aquatic ecosystems

Unit 6. Ecosystems/Natural Resources: Types, environmental and human importance.

Unit 7. Applications of Plant Ecology

Practical Activities:

1. To compare the chemical characteristics of the soil samples collected from varied habitats.

- a) Moisture level
- b) Carbonate content
- c) Nitrate content
- d) pH value

2. To calculate the amount of total solid, suspended solid and dissolved solid particles from different water samples.

3. To study the distribution of different tree species in the natural and artificial forests.

4. To study the community by determining:

- a) Frequency
- b) Abundance
- c) Density
- d) (all by quadrat method)

5. To determine the biomass of producers in the given area.

Mode of Delivery

- ✓ Lectures, Group discussion, Fieldwork on ecological techniques and Group project.

Assessment Criteria

Continuous assessment will be implemented in assessing student's performance. The details of assessment breakdown are given below.

Assignments	15%
Mid exam	15%
Lab report	15%
Field trip report and presentation.....	15%
Final exam	40%
Total.....	100%

Recommended Readings

Begon, M. 1990. Ecology: Individuals, Populations and Communities, 2nd ed. Blackwell Scientific, Cambridge, MA.

Begon, M., Harper, J.L. and Townsend, C.R. (1990). Ecology: Individuals, Populations and Communities. Blackwell Scientific Publications.

Cappuccino, N. and Price P.W. (1995). Population Dynamics: New Approaches and Synthesis. Academic Press.

Mulkey, S.S., Chazdon, R.L., and Smith, A.P. (1996). Tropical Forest Plant Ecophysiology. Chapman & Hall.

Odum, E.P. (1971). Fundamentals of Ecology. 3rd ed., W.B. Saunders Company, Philadelphia.

Pearcy, R.W., Ehleringer, J., Mooney, H.A. and Rundel, P.W. (1991). Plant Physiological Ecology: Field Methods and Instrumentation. Chapman & Hall. London.

Riely, J.O. and Page, S. (1990). Ecology of Plant Communities. Halsted Press, New York.

Robert, L.M. (1992). Elements of Ecology. Harper Collins Publishers Inc. New York.

Smith, R.L. and Smith, T.M. (2003). Elements of Ecology. Benjamin Cunmmings, San Francisco.

Winter, E.J. (1974). Water, Soil and the Plant. MacMillan Press Ltd.