Birla Institute of Technology & Science, Pilani
Hyderabad Campus

INSTRUCTION DIVISION, SECOND SEMESTER 2012-13

Course Handout Part II

Date: 02.01.2013

In addition to Part – I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No.	: **BIO C322**
Course Title	: **ECOLOGY**
Instructor-in-charge	: **P. SANKAR GANESH**
Instructor	: **P. Sankar Ganesh**

1. Scope and objective of the course:

In the past few decades, man has achieved mental development that has translated into scientific and technological innovations to improve/manipulate life and environment. As a consequence the science of ecology, dealing with organism-environment relationships, has become more and more an integrated discipline that links the natural and the social sciences. While ecology retains its strong and basic roots in biological sciences, it is a 'hard' science as it involves mathematics, chemistry and physics. It is a 'soft' science too as it involves a study of human behavior and activity. As an integrated science, ecology has a vast potential of application to human welfare, merging natural science with it's with social, economic and political counterparts. In short, ecology helps us understand our planet – Mother Earth – better and devise sustainable methods to preserve it.

The objective of this course is to make the students aware of the various segments of our environment, interaction between abiotic and biotic components of ecosystems, energy and material utilization strategies, anthropogenic activities leading to ecosystem imbalance, depletion of natural resources and the impact of 'greedy' and polluting technological developments on the ecosystem. The course culminates by looking at the Indian scenario on the protection of local ecology and environment.

2. Text book (TB):

Eugene P. Odum & Gary W. Barrett, *Fundamentals of Ecology*, 5th Ed, Cengage Learning, India Edition, 2005.

3. Reference Book (RB):

E J Kormondy, *Concepts of Ecology,* 4th Ed, Prentice Hall of India Pvt. Ltd., 1996.

4. Suggested Reading:

Thomas M. Smith & Robert Leo Smith, *Element of Ecology*, 6th Ed, Pearson Education, Inc., 2006.

Madhab Chandra Dash & Satya Prakash Dash, *Fundamentals of Ecology*, 3rd Ed, Tata Mc Graw Hill Education Private Limited, New Delhi, 2009.

Richard T. Wright & Dorothy F. Boorse, *Environmental Science: Towards a Sustainable Future*, 11th Ed, Benjamin Cummins, 2011.

Daniel B. Botkin, & Edward A. Keller, *Environmental Science: Earth as a Living Planet*, 7th Ed, Wiley, India, 2010.

5. Selected Web resources:

http://ecology.com

http://www.ecologyasia.com

http://pbil.univ-lyon1.fr/Ecology/Ecology-WWW.html

http://www.envirolink.org

http://ice.ucdavis.edu

6. Course Plan:

Lecture Number	*Learning objectives*	*Topics to be covered*	*Reference chapter*
1	Introduction	Scope of ecology	TB Chap 1
2-3	Beginning the science of Ecology: Segments of environment	Soil, nutrients and other limiting & regulatory factors	TB Chap 5
4	Principles pertaining to limiting factors	Minimum and tolerances laws	TB Chap 5
5	Principles and concepts of ecosystem	Concept and structure	TB Chap 2
6		Biodiversity	
7		Ecosystem cybernetics & Technoecosystems	
8	Regional Ecology: Major ecosystem types	Marine ecosystems	TB Chap 10
9		Fresh water ecosystems	
10-11		Terrestrial ecosystems, desert ecology, human-designed and managed systems	
12	Nutrient budgets	Internal and external nutrient budget	TB Chap 5
13-14	Principles and concepts of energy flow in ecosystems	Global production and decomposition	TB Chap 2
15		Solar radiation and the energy environment	RB Chap 6 TB Chap 3
16-17		Concept of productivity: Measuring primary productivity	RB Chap 6
18		Ecological pyramids and energy flow models	RB Chap 7
19		Energy partitioning in food chains and food webs	RB Chap 7
20	Population ecology : concept and attributes	Properties of population & carrying capacity	TB Chap 6
21		Density-independent and density-dependent mechanisms of population regulation	
22		Allee principle, home range & territoriality	
23		Metapopulation dynamics, energy partitioning and optimization: *r*- and *K*- selection	
24	Community Ecology : structure and function	Types of interactions among species	TB Chap 7
25		Cooperation and competition	
26		Positive and negative interactions	
27-28		Concepts of habitat, ecological niches, guilds and paleoecology	

Lecture Number	Learning objectives	Topics to be covered	Reference chapter
29	Ecosystem development: Evolution	Ecosystem development & succession	TB Chap 8
30-31		Concept of climax, evolution of biosphere	
32	Pollution ecology	Anthropogenic impact on aquatic ecosystems	RB 2 Chap 8 & class notes
33		Anthropogenic impact on terrestrial ecosystems	
34		Solid waste management	
35		Anthropogenic impact on the atmosphere	
36-38	Introduction to environmental biotechnology	Basic concept of environment and its components. Biotechnology for environment; definitions and facts. A brief introduction to the topic with relevant examples	Class notes
39-40	Ecology and society	Viewing Indian society from an ecological perspective.	Class notes

Portions for self-study:

- Insolation, precipitation and climate (RB1 Ch 4)
- Biogeochemical cycles (TB Ch 4)

7. Evaluation scheme:

Evaluation component	Duration	Weightage, %	Date and time	Nature of the Component*
Test – 1	1 Hr	10	23.02.2013 8.00 – 9:00 AM	OB
Test – 2	1 Hr	15	01.04.2013 8.00 – 9:00 AM	CB
Surprise tutorial tests/ quiz	Diverse	20	Continuous Evaluation	CB
Assignments/ Class work	Diverse	15	Continuous Evaluation	OB/ Take-Home
Comprehensive examination	3 Hrs	40	08.05.2013 2:00 PM – 5:00 PM	CB

*OB: Open book, CB: Closed book

8. Chamber consultation hour: To be announced in the class.

9. Grading policy: Award of grades will be guided in general by the histogram of marks. Decision on border line cases will be taken based on individual's sincerity, student's regularity in attending classes, and the section instructor's assessment of the student.

10. Make-up policy: Make-up for Test 1 or 2 will be given only in genuine (medical emergency) cases of absence. If the absence is anticipated, before the examination, prior permission of the Instructor-in-charge is necessary. The request for make-up should reach the Instructor-in-charge at the earliest. Make-ups for class tests/ quizzes and assignments are not given. Also refer to Clause 4.07 of BITS *Academic Regulations* for more details.

11. Notices: All notices/ announcements regarding this course shall be displayed in the notice board of Department of Biological Sciences, located at the 1st floor of 'A' Block.

Instructor In-charge
BIO C322