



# NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

Ravangla Campus

Barfung Block, Ravangla Sub Division, South Sikkim-737139

## Subject: Environmental Studies

(EC 3024/CS 4001/EE 3008/CE 3006/ME 3001)

Fourth Semester (all branches/disciplines), 2016

## Syllabus

### Module 1

Definition, scope and importance - renewable and non-renewable resources - Natural resources - forest, water, mineral, food and energy and land resources - study of problems - Role of individual in conservation - equitable use of resources and sustainable lifestyles.

### Module 2

Eco systems - structure and function - producer, consumer and decomposer - energy flow - ecological succession- food chains- forest, grassland, desert and aquatic ecosystems - Biodiversity and conservation.

### Module 3

Biodiversity: Definition, Genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

### Module 4

Environmental pollution - air, water, soil, marine, thermal, nuclear and noise pollution- methods of prevention – waste management - disaster management - environmental ethics - sustainable development models - water conservation - climate change and global warming - ozone layer depletion - nuclear holocaust - case studies - consumerism and waste products.

### Module 5

Legislation in India - Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Other acts, Issues involved in enforcement of environmental legislation, Public awareness.

### Module 6

Human population and the environment - Population growth, Family welfare programme, Environment and human health, Human rights, HIV/AIDS, Women and child welfare, Role of Information Technology in environment and human health.



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## Lesson Plan

Teachers

1. Professor A.B. Samaddar (ABS)
2. Dr. Achintesh Narayan Biswas (ANB)

Module Number	Lecture Number	Topics to be covered
1 & 2	1	Introduction to Environmental Studies and its need to engineers; Need for public awareness; Introduction to renewable and Non-renewable resources.
	2	Natural Resources: a) Forest Resources: Use and over exploitation, deforestation, case studies- Timber extraction, mining, dams and their effects on forest and tribal people.
	3	b) Water Resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems
	4	c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
	5	d) Food Resources: world food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizer – pesticide problem, water logging, salinity, case studies.
	6	e) Energy resources-growing needs, renewable energy resources–solar, wind, hydropower, hydrogen fuel and non-renewable energy resources-coal, natural gas, nuclear energy



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	7	f) Land Resources: Land as a resource, land degradation, man induced landslides, soil erosion, and desertification.
	8	g) Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.
	9	Presentation by Students
3	10	Definition and concept of an Ecosystem, structure and function of an ecosystem- producers, consumers and decomposers.
	11	Energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids.
	12	Characteristic features, structure and function of: forest ecosystem, grassland ecosystem
	13	Desert ecosystem and aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)
	14	Presentation by Students
4	15	Definition, concept and value of Biodiversity; Conservation of Biodiversity: Genetic, Species and ecosystem diversity, bio-geographical classification of India
	16	Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
	17	Role of biodiversity in addressing new millennium challenges; Biodiversity at global, national and local levels, India as a mega diversity nation, hot spots of biodiversity



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	18	Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
	19	Endemic, endangered and extinct species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
	20	Presentation by Students
<b>5</b>	21	Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, Soil pollution
	22	Marine pollution, noise pollution, thermal pollution and nuclear hazards
	23	Solid waste management – causes, effects and control measures of urban and industrial wastes
	24	Role of an individual in prevention of pollution, pollution case studies
	25	Disaster management – floods, earthquake, cyclone and landslides
	26	Electronic product life cycle, probable environment pollution at different stages; Electronic waste – materials, waste management, Recycling electronics
	27	Impact of materials and processes used for electronic product manufacturing, removal of hazardous substances from products
	28	Presentation by Students
<b>6</b>	29	Social Issues and environment: from unsustainable to sustainable development, urban problems related to energy



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	30	Water conservation, rain water harvesting, watershed management
	31	Resettlement and rehabilitation of people, its problem and its concerns, case studies
	32	Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, Ozone layer depletion
	33	Nuclear power fall outs. Accidents and holocaust, case studies
	34	Wasteland reclamation, consumerism and waste products, Issues involved in enforcement of legislation and public awareness
	35	Design for environment (DFE), need for regulations, impact of work culture in modern world
<b>7</b>	36	Human population and the environment: Population growth, variation among nations
	37	Population Explosion – Family welfare program, environment and human health
	38	Role of Information Technology in environment and human health, case studies
	39	Biological impact of materials used in electronic products and manufacturing process
	40	Impact of signal radiation from electronic products

N.B.

1. Each lecture is of 1 hour duration.
2. Some of the additional topics relevant for Civil Engg. will be taught separately.



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## TEXT BOOKS:

1. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd Edition, **2013**.
2. A.Kaushik and C.P. Kaushik, *Environmental Studies*, New Age International (P) Ltd. Publications, 4th Edition, **2014**.
3. K. R. Nambiar, *Textbook of Environmental Studies*, Sci Tech Publications India (P) Ltd., **2009**.
4. Sawyer and McCarty, *Chemistry for Environmental Engg.*, Tata McGraw-Hill, New Delhi, **2003**.

## REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, **2011**.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, **2009**.
3. Dr. B S Chauhan, *Environmental Studies*, University Science Press, 1st Edition, **2008**.
4. M. Anji Reddy, *Textbook of Environmental Sciences and Technology*, BS Publications, **2007**.
5. Larry W Canter, *Environmental Impact Assessment*, McGraw-Hill Education, 2<sup>nd</sup> edition, **1996**.

## FURTHER READING/REFERENCES

1. Hawkins R.E., *Encyclopedia of Indian Natural History*, Bombay Natural History Society, Bombay (R).
2. Down to Earth, Centre for Science and Environment (<http://www.cseindia.org>)
3. Useful information can be found at the official website of Botanical Survey of India (<http://www.envfor.nic.in>).
4. Trivedi R.K., *Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadarads*, Vol I and II, Enviro Media.