

<b>Course Number</b>	: HS529
<b>Course Name</b>	: Natural Resource and Development
<b>Credits</b>	: 3-0-0-3
<b>Prerequisites</b>	: None
<b>Intended for</b>	: Post graduate students in SHSS
<b>Distribution</b>	: Core course for M.A. in Development Studies
<b>Semester</b>	: Even/Odd

### **1. Preamble:**

Understanding Natural resources and their management in the context of solving the development challenges is an important area. This course introduces the students about the natural resources, their role in energy generation with a focus on renewable energy, environmental impacts (in terms of waste water, solid waste, air pollution) due to uncontrolled utilisation of natural resources, and biodiversity as an important natural resource for human development. It looks into the biodiversity conservation and its role in poverty alleviation, policies and practices with case studies. Concepts supported by selected topics from basic sciences, social sciences and engineering will provide better insights and play a significant role in developing future development practitioners aware of these important sectors. Overall, the course will allow the students to better manage these resources in parallel to development. This course will be taught by the faculties from the School of Basic Sciences and the School of Engineering of the institute.

### **2. Course module:**

#### **Module 1: Natural resources and their role in sustainable energy (14 hours)**

- Introduction: Natural Resources – renewable v/s non-renewable. What is renewable energy? Why do we need renewable energy? Different renewable energy sources. (3 hours)
- Solar energy: potential of solar energy reaching earth surface, collecting sunlight, solar photovoltaic and solar thermal techniques, solar power plants, solar water desalination, solar dryers, future challenges (3 hours)
- Wind energy: Wind energy availability and basic working principle of wind turbines, resource assessment overview, modern wind turbines, installations and wind farms, advantages and limitations of wind farms (3 hours)
- Biomass energy: Organic matters available on renewable basis like forests, agricultural, mill and industrial wastes etc., direct fired plants, co fired power plants, gasification (3 lectures)
- Limitations of renewable sources. (2 hours)

#### **Module 2: Sustainable Development and Pollution Prevention (14 hours)**

- Natural Cycles: Water cycle, oxygen cycle, phosphorous cycle, Appreciation of disturbance in these cycles as cause of pollution. (2 lectures)
- Water Pollution Control and Technologies: Indian potable water and treated waste water standards, Health impact of potable drinking water, sources of water pollutants for urban and rural habitats, Waste water treatment technologies (4 lectures)
- Air Pollution Control Technologies: Gaseous and particulate emissions, Health impact, sources of gaseous pollutants for urban and rural habitats, Air pollution control technologies (4 lectures)

- Solid Waste Management: Case Studies on Best Practices of Domestic Solid Waste Management/ Case Studies on Electronic Waste Management Practices (4 lectures)

**Module 3: Introduction to Biodiversity and Conservation (14 hours)**

- The key concepts of biodiversity, its definition, meaning and functional significance (2 lectures)
- Conservation of natural resources - Water, Soil, Flora, Fauna, endangered species etc.; In-situ and Ex-situ conservation (2 lectures)
- International and National conventions (2 lectures)
- Biodiversity and Conservation for Development - Poverty alleviation (2 lectures)
- Critical approaches to Biodiversity conservation - policy and practice (1 lecture)
- Biodiversity Technologies for Conservation (2 lectures)
- Selected Case studies (3 lectures)

**3. Textbooks:**

1. Ruth Weiner Robin Matthews, Environmental Engineering 4th Edition, Elsevier 2003, ISBN 9781493302925
1. Aldo V.da Rosa, Fundamental of Renewable Energy Processes, Elsevier Press(2009)
3. Biodiversity and Conservation (Routledge Introductions to Environment series) 2nd Edition by Michael J Jeffriesby, 2006, ISBN-10: 0415343003.

**4. References:**

1. Gautam, A., De, S., Dhar, A., Gupta, J.G., Pandey, A. (Eds.), Sustainable Energy and Transportation, Springer Singapore, 2018, ISBN 978-981-10-7508-7
2. <http://worldhappiness.report/ed/2017/>
3. <http://www.epa.ohio.gov/ocapp/p2/sustainable.aspx#124473580-practices>
4. Jahangir Hossain, Mahmud Apel, Large Scale Renewable Power Generation: Advances in Technologies for Generation, Transmission and Storage (Green Energy and Technology), Springer; (2014)

**5. Similarity Content Declaration with Existing Courses: None**

S.N.	Course Code	Similarity Content	Approx. % ofContent
1	EN502	Pollution control	~30%

**6. Justification for new course proposal if cumulative similarity content is > 30%:**