

C1B: Fundamentals of Environmental Science

Course instructors: Priyanka Jamwal (Coordinator), Jagdish Krishnaswamy, Shrinivas Badiger, Veena Srinivasan

Number credits: 3

Class schedule: Mon (1100-1150), Tue (1100-1150), Labs; Tue (1400-1650)

Prerequisites: None

Topics

Environmental processes at global, regional and local scales; Stocks, fluxes and feedback mechanisms in biogeochemical cycles (C, N, water); Major environmental challenges (water resources, agriculture, soil degradation, Climate change); Sustainability science

Outcomes

Understanding the processes that govern the flow of contaminants/nutrients through various environmental media, application of climate science, soil science, water chemistry and hydrology in addressing the issues related to water resources management, applying the multidisciplinary approach to address the issue of resource sustainability.

Textbooks

- Biogeochemistry: An Analysis of Global Change. William H. Schlesinger. Academic Press. (II Edition),
- Chemistry for environmental engineering and science. Sawyer, McCarty and Parkin (5th Edition Tata Mcraw-Hill,
- Surface Water Quality Modeling. Stephen C. Chapra. Waveland Press, Inc.

Grading pattern: Class participation & attendance (10%), Assignments (20%), Labs (20%), Quizzes (10%); Final examination (30%)

Course schedule

Date	DoW	Time	Lecture	Instructor	Readings
7-Aug-2017	Mon	1100-1150	Introduction to the course, earth as a biogeochemical system	JK	
8-Aug-2017	Tue	1100-1150	Course competency test (optional)	Madhavi	
8-Aug-2017	Tue	1400-1650	Toposheet reading (Lab exercise-1)	Lab	Lab
14-Aug-2017	Mon	1100-1150	Biogeochemical cycles and thermodynamic principles	JK	
15-Aug-2017	Tue	Independence Day (GH)			
21-Aug-2017	Mon	1100-1150	Introduction to composition, evolution and processes of the atmosphere, lithosphere and biosphere	JK	
22-Aug-2017	Tue	1100-1150	Carbon cycle	JK	
22-Aug-2017	Tue	1400-1650	Catchment delineation (Lab exercise-2)	SB	Lab
28-Aug-2017	Mon	1100-1150	Carbon cycle	JK	
29-Aug-2017	Tue	1100-1150	Understanding stocks, flows and feedbacks	Veena	
29-Aug-2017	Tue	1400-1650	Above ground carbon estimation	SB/JK	Lab
4-Sep-2017	Mon	1100-1150	Hydrological cycle – overview (Lecture assignment 1: BGC and Carbon cycle)	JK	Assignment -1
5-Sep-2017	Tue	1100-1150	Water – land surface processes	SB	
5-Sep-2017	Tue	1400-1650	STELLA - modeling stocks and flows	VS and SB	Lab
11-Sep-2017	Mon	1100-1150	Groundwater	VS and SB	
12-Sep-2017	Tue	1100-1150	Catchment hydrology	SB	
12-Sep-2017	Tue	1400-1650	Tank water balance exercise	SB	Lab
18-Sep-2017	Mon	1100-1150	Soil properties and processes	JK	
19-Sep-2017	Tue	1100-1150	Soil erosion and sediment transport	SB	
19-Sep-2017	Tue	1400-1650	Soil properties and water content lab (Lab exercise-4)	JK and SB	Lab
25-Sep-2017	Mon	1100-1150	Chemical kinetics	PJ	
26-Sep-2017	Tue	1100-1150	Nitrogen Cycle	PJ	
26-Sep-2017	Tue	1400-1650	Water quality lab: sample collection	PJ	Lab
2-Oct-2017	Mon	Gandhi Jayanti (GH)			
3-Oct-2017	Tue	1100-1150	The physics and chemistry of air and water pollution	PJ	
3-Oct-2017	Tue	1400-1650	Water Quality	PJ	Lab
9-Oct-2017	Mon	1100-1150	QUIZ- 1		
10-Oct-2017	Tue	1100-1150	The physics and chemistry of air and water pollution (Lecture assignment 2: Carbon and Water Cycle)	PJ	Assignment -2
10-Oct-2017	Tue	1400-1650	Lab	Lab	Lab
16-Oct-2017	Mon	1100-1150	Overview of water and wastewater treatment	PJ	

17-Oct-2017	Tue	1100-1150	Water quality modelling	PJ	Assignment -3
17-Oct-2017	Tue	1400-1650	Water Quality Analysis - BOD/DO Analysis, BOD Curve	Lab	Lab
23-Oct-2017	Mon	1100-1150	Physics of climate-land-ocean-atmosphere linkages	JK	
24-Oct-2017	Tue	1100-1150	Physics of climate and climate change	JK	
24-Oct-2017	Tue	1400-1650	Stream discharge and pollutant flux measurement field trip (Lab exercise 5)	Lab	Lab
30-Oct-2017	Mon	1100-1150	QUIZ-2		
31-Oct-2017	Tue	1100-1150	Pollution and human health – links and risk assessment	PJ	
31-Oct-2017	Tue	1400-1650	Documentary screening and discussion	Lab	Lab
6-Nov-2017	Mon	1100-1150	Pollution and human health – links and risk assessment	PJ	
7-Nov-2017	Tue	1100-1150	Pollution and human health – links and risk assessment (Lecture assignment 4: Pollution, Health and CC)	PJ	Assignment -4
7-Nov-2017	Tue	1400-1650	Field visit (Byranmanagla)	PJ	Lab
13-Nov-2017	Mon	1100-1150	Sustainability in Agriculture – food production and security	SB	
14-Nov-2017	Tue	1100-1150	Sustainability in Agriculture – food production and security	Sb	
14-Nov-2017	Tue	1400-1650	Documentary screening and discussion	Sb	Lab
20-Nov-2017	Mon	1100-1150	Water resources sustainability – allocation, conflict, use, sustainability	VS	
20-Nov-2017	Mon	1100-1150	Water resources sustainability – allocation, conflict, use, sustainability (Lecture assignment 5: Ag and water security)	VS	Assignment -5
21-Nov-2017	Tue	1400-1650	Water and carbon foot-print lab	VS	Lab
27-Nov-2017	Mon	1100-1150	Forest Ecosystem: production and sustainability		Guest lecture_Sh arad?
28-Nov-2017	Tue	1100-1150	Climate change impacts on humans		Guest lecture_Sh arad?
28-Nov-2017	Tue	1400-1650	Lab Viva	Lab	Lab
4- Dec-2017	Mon	1000-1200	Final examination		