Department	Civil Engineering	**Semester**	Spring 2019
Course Title	Environmental Science for Civil Engineers	**Course Code**	CV533
Program	MS (Civil Engineering)	**Credit Hrs.**	3
Instructor	Dr. Saman Shahid	**Email**	saman.shahid@nu.edu.pk
Course Objectives:	Cities, Pollution, Wastes and Sustainable Energy Issues: To introduce graduate civil engineering students regarding urban (city) environments, hazards, sustainable/alternative energy sources, various environmental issues such as pollution, water management, global warming, health impacts and evaluating respective risk assessments. Students would be able to identify factors influencing our environment for monitoring, sustaining resources and mitigating management.		

Text Book(s)	**Title**	Environmental Science-Earth as Living Planet (9th Edition)
	Author(s)	*Daniel B. Botkin & Edward A. Keller*
	Publisher	© 2014 by John Wiley & Sons Inc.
Ref. Book(s)	**Title**	Environmental Science: Toward a Sustainable Future (13th Edition)
	Author(s)	*Richard T. Wright & Dorothy F. Boorse*
	Publisher	© 2014 Pearson
	Title	Environmental Science in Building (8th Edition)
	Author(s)	Randall McMullan
	Publisher	© 2018 Palgrave
	Title	Principles of Environmental Engineering & Science (3rd Edition)
	Author(s)	*Mackenzie L Davis & Susan J Masten*
	Publisher	© 2013 McGraw-Hill

Course Contents/Topics:

Week	Course Contents	Remarks
1	Chapter 8: Environmental Health, Pollution and Toxicology Environmental Health, Categories of Pollutants and Toxins, Infectious Agents, Toxic Heavy Metals, Organic Compounds, HAAs, Nuclear Radiation, Thermal Pollution, Particulates, Asbestos, Electromagnetic Fields, Noise Pollution, Effects of Pollutants	
2	Chapter 14: Energy-Some Basics Outlook for Energy, Energy Efficiency, Energy Sources and Consumption, Fossil Fuels and Alternative Energy Sources, Energy Conservation, Increased Efficiency and Cogeneration, Building Design, Industrial Energy, Sustainable-Energy Policy, Integrated Sustainable Energy Management	Quiz 1
3	Chapter 15: Fossil Fuels and the Environment Fossil Fuels, Oil & Gas Resources, Tar Sands & Shale Oil, Natural Gas, Shale Gas, Tight Gas, Coal-bed Methane, Methane Hydrates, The Environmental Effects of Oil & Natural Gas: recovery, refining, delivery and use, Coal Mining and the Environment, Mountaintop Removal, Underground Mining, Transporting Coal	
4	Chapter 16: Alternative Energy and the Environment Solar Energy, Passive Solar Energy, Active Solar Energy, Solar Thermal Generators, Solar Energy and the Environment, Electricity from Renewable Energy into a Fuel for Vehicles, Water Power, Hydropower Systems, Ocean Energy Technology, Wind Power and the Environment, Biofuels, Geothermal Energy,	
5	Chapter 17: Nuclear Energy and the Environment Role of Nuclear Power Plants in Energy Production, Conventional Nuclear Reactors, Nuclear Energy and the Environment, Effects of Radioisotopes on Human Health, Radiation Doses & Health, Nuclear Power Plant Accidents, Radioactive Waste management, Future of Nuclear Energy	

6	Chapter 19: Water Pollution and Treatment Biochemical Oxygen Demand (BOD), Eutrophication, Waterborne Diseases, Oil, Sediment, Acid Mine Drainage, Surface Water Pollution, Groundwater Pollution, Wastewater treatment (Primary, Secondary And Advanced), Chlorine Treatment, Land Application of Wastewater, Water Reuse	Midterm 1
7	Chapter 20: The Atmosphere and Climate Change Origin of Global Warming, 20th Century Methods to Reconstruct Past Temperatures, Discovery of Continental Glaciations and Ice Ages, Sediments, Tree Rings, Ice Cores, Corals, Carbon 14, Structure of the Atmosphere, Atmospheric Processes: Temperature, Pressure and Global Zones of High/Low Pressure, Energy and the Atmosphere, Milankovitch Cycles, Solar Cycles	
8	Chapter 20: The Atmosphere and Climate Change Oceans and Land impacts on Climate, Albedo Effects, Greenhouse Effect and Gases (CO_2, Methane, Chlorofluorocarbons, Nitrous Oxide), Greenhouse Gases and Climate, Oceans and Climate Change, Climate Change and Feedback Loops, El Nico & Climate, Ocean Conveyor Belt	Quiz 2
9	Chapter 21: Air Pollution General Effects of Air Pollution, Air Pollutants, Criteria Pollutants (Sulfur Dioxide, Nitrogen Oxides, Carbon Monoxide), Acid Rain, Ozone and Other Phytochemical Oxidants, High Altitude (Stratospheric) Ozone Depletion, Particulate Matter and Ultrafine Particles, Lead, Air Toxics (Hydrogen Sulfide, Hydrogen Fluoride, Mercury, Volatile Organic Compounds, Methyl Isocyanate, Benzene, Acrolein,	Midterm 2
10	Chapter 21: Air Pollution Urban Air Pollution-Chemical & Atmospheric Processes, Future Trends for Urban Air Pollution, Controlling Common Pollutants of the Lower Atmosphere, Air Quality Standards, Indoor Air Pollution and Sources, chimney effect, Heating, Ventilation, and Air-Conditioning Systems, Heating, ventilation, Environmental tobacco smoke, Radon Gas, Bick building syndrome, Controlling Indoor Air Pollution,	
11	Chapter 22: Urban Environment City Life, City As System, Location of Cities, Site & Situation, City Planning and the Environment, Cities As Environment, Energy Budget and Solar Energies in Cities, Urban Atmosphere, Pollution, Soils, Climate, Water, Vegetation, Animal Pests & Wildlife	Quiz 3
12	Chapter 22: Urban Environment Urban Atmosphere, Pollution, Soils, Climate, Water, Vegetation, Animal Pests & Wildlife	
13	Chapter 23: Materials Management Mineral Resources & Reserves, Impacts of Mineral Development, Integrated Waste Management, Reduce, Reuse, Recycle, Municipal Solid-Waste Management, Onsite Disposal Composting, Incineration, Open Dumps, Sanitary Landfills, Hazardous Waste, Land Disposal, Alternatives to Land Disposal of Hazardous Waste, Ocean Dumping	
14	Revision, presentations and self-assessment tests.	
15	Final exam	

Teaching Methodology:

Lecturing, Presentations, Assignments, Demonstrations, Report Writing.

Evaluation Criteria:

Assessment Tools	Weightage
Assignments+ Presentation	10%
Quizzes	15%
Midterms (I+II)	30%
Final Exam	45%

Important Instruction:

Plagiarism is not tolerable in any of its form. According to HEC, the similarity index should be less than 19%.