

**DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

COURSE PLAN – PART I

Name of the programme and specialization	M.Tech Civil Engineering		
Course Title	GEOENVIRONMENTAL ENGINEERING		
Course Code	CE722	No. of Credits	3
Course Code of Pre-requisite subject(s)			
Session	July, 2019	Section (if, applicable)	Elective
Name of Faculty	Dr. Jeevan Joseph	Department	Civil Engineering
Email	jeevan@nitt.edu	Telephone No.	9619474630
Name of Course Coordinator(s) (if, applicable)	Dr. S. T. Ramesh		
E-mail	stramesh@nitt.edu	Telephone No.	
Course Type	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	

Syllabus (approved in BoS)

Basic concepts related to soil pollution; Sources of pollution- industrial, mining, agricultural, and municipal; types of contaminants; Impact of contamination- physical and chemical properties of soil; Retention behavior- governing factors, sorption characteristics, isotherms; Contaminant transport- saturated and unsaturated flow, pore size distribution characteristics; Site investigation- Soil sampling, sample handling, transportation, characterization, preservation and storage; Non-destructive techniques- electromagnetic, thermal and seismic, Soil remediation- need and approach, Techniques- soil washing, permeable reactive barriers, solidification, vacuum extraction, electro kinetic remediation, thermal desorption; Bioremediation, phytoremediation, soil fracturing; Case studies on polluted sites and issues related to environment. Containment systems and basic principles – carbon dioxide sequestration, Grout curtains, Ground freezing, Compacted soil liners, Geosynthetic clay liners.

References

1. Rowe R.K., "Geotechnical and Geoenvironmental Engineering Handbook" Kluwer Academic Publications, London, 2000.
2. Reddi L.N. and Inyang, H. I., "Geoenvironmental Engineering, Principles and Applications" Marcel Dekker Inc. New York, 2000.
3. Yong, R. N., "Geoenvironmental Engineering, Contaminated Soils, Pollutant Fate, and Mitigation" CRC Press, New York, 2001.
4. Sharma H.D. and Reddy K.R., "Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies" John Wiley & Sons, Inc., USA, 2004.

COURSE OBJECTIVES

1. To study the sources of soil contamination and its impact on geoenvironment.
2. To familiarize with the retention and flow behavior of contaminants in soil.
3. To realize the significance of sampling techniques in geoenvironmental characterization.
4. To understand the state of the art methodologies for soil decontamination and containment.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)*										
	a	b	c	d	e	f	g	h	i	j	k
To identify the origin, nature, and extent of contamination in field.	H	M	L	H	L	L			M		M
To adopt suitable sampling techniques for geoenvironmental characterization	H	M		M		M	L		M	H	
To predict the retention and flow properties of contaminants.	M	L		M		M		L	M		
To suggest the remediation techniques for decontamination	H	M	M	H	M	L	L		M	M	M

* a: Scholarship of Knowledge; b: Critical Thinking; c: Problem Solving; d: Research Skill; e: Usage of modern tools; f: Collaborative and Multidisciplinary work; g: Project Management and Finance; h: Communication; i: Life-long Learning; j: Ethical Practices and Social Responsibility; k: Independent and Reflective Learning

COURSE PLAN – PART II

COURSE OVERVIEW

The course is designed in such a way to impart the significance of geo-environmental issues pertaining to the contemporary engineering practises.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 5 th week Aug	Introduction to Geotechnical and Environmental engineering	Lecture/ Chalk and Board/PPT/Discussion
2	Week 2 1 st week Sept	Origin of soil, physical, chemical and mineralogical characteristics; Introduction to geo-environmental engineering, various perspectives	Lecture/ Chalk and Board/PPT/Discussion
3	Week 3 2 nd week Sept	Soil Pollution and various sources of contamination	Lecture/ Chalk and Board/PPT/Discussion
4	Week 4 3 rd Week Sept	Mitigation techniques for ground contamination	Lecture/ Chalk and Board/PPT/Discussion
5	Week 5 4 th week of Sept	Impact of contamination on physical and chemical properties of soil; sorption characteristics	Lecture/ Chalk and Board/PPT/Discussion
6	Week 6	Contaminant transport through saturated	Lecture/ Chalk and

	1 st week of Oct	and unsaturated soil stratum, effect of porosity on fluid flow	Board/PPT/Discussion
7	Week 7 2 nd week of Oct	Site investigation- Soil sampling, sample handling, transportation, characterization, preservation and storage	Lecture/ Chalk and Board/PPT/Discussion
8	Week 8 3 rd week of Oct	Non-destructive techniques- electromagnetic, thermal and seismic response of geomeaterials	Lecture/ Chalk and Board/PPT/Discussion
9	Week 10 4 th week of Oct	Soil remediation- need and approach,	Lecture/ Chalk and Board/PPT/Discussion
10	Week 11 5 th week of Oct and 1 st week of Nov	Soil remediation Techniques- soil washing, permeable reactive barriers, solidification, vacuum extraction,	Lecture/ Chalk and Board/PPT/Discussion
11	Week 12 2 nd week of Nov	Case study Presentation	
12	Week 13 3 rd week of Nov	Electro kinetic remediation, thermal desorption; Bioremediation, phytoremediation	Lecture/ Chalk and Board/PPT/Discussion
13	Week 14 4 th week of Nov	Case studies on polluted sites and issues related to environment.	Lecture/ Chalk and Board/PPT/Discussion
14	Week 15 5 th week of Nov	Containment systems and basic principles – carbon dioxide sequestration, Grout curtains,	Lecture/ Chalk and Board/PPT/Discussion
15	Week 16 1 st week of Dec	Ground freezing, Compacted soil liners, Geosynthetic clay liners.	Lecture/ Chalk and Board/PPT/Discussion

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Group Activity	4 th Week of Sept	15 min/team	10
2.	MID SEM	2 nd Week of Oct	2 hr	30
3	Case study Presentation	2 nd week of Nov	15 min/team	10
CPA	Compensation	1 st Week of Dec	2 hour	

	Assessment*			
4	Final Assessment *	3 rd week December	3 hours	50

***A minimum of 30 % for the Final assesment and a cumulative of 40 % (summing up all the mode of assesment) is mandatory for passing the subject.**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

It is proposed to take feedback from the students, at the end of the semester to evaluate the execution of the course.

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

- Mode of correspondence would be through Email and phone calls are allowed only for the Class Representatives.

COMPENSATION ASSESSMENT POLICY

- Compensatory assessment shall be given for students providing genuine reasons (reported with in a weeks' time from the actual date of assessment) for their absentia during the regular assessments.
- Written examination for a time duration of 2 hr, covering the entire syllabus would be compensatory assessment policy for students missing Mid Semester.
- Students missing Assessment 1 and 3 may have to undergo the same assessment methodology scheduled in the actuals, which would be conducted in 1st week of Dec.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- **Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

- The Course instructor would be available for discussions, if any, during office hours, at Room No:18; Civil Dept.
- Students are free to post any queries or clarifications to jeevan@nitt.edu.

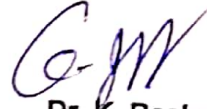
FOR APPROVAL



Dr. Jeevan Joseph
Course Faculty



Dr. V. Sunitha
CC-Chairperson



Dr. K. Baskar
HOD