



Scheme & Syllabus for

B.Tech Minor in

Climate, Health and Environmental Sustainability

DEPARTMENT OF CIVIL ENGINEERING

2023-24

DEPARTMENT OF CIVIL ENGINEERING

Vision

To uphold the Department as a leader in community development through innovation and excellence in diverse areas of Civil Engineering to meet the global challenges and market demands.

Mission

- 1. To provide the students a strong theoretical knowledge and practical skills to understand the basic concept and fundamentals of various Civil Engineering subjects.
- 2. To be competent and skilled enough to take the challenges in Research, Consultancy and Entrepreneurship.
- 3. To encourage the students in developing professional ethics through discipline and principles.

Programme Educational Objectives (PEOs)

The graduates of the program will be

- **PEO1** Equipped with fundamentals of civil engineering along with interdisciplinary science, engineering and management concepts.
- **PEO2** Equipped with advanced and emerging field of civil engineering practices to compete and match with the industrial requirements.
- PEO3 Competent enough to conceive the ideas, prepare plan, design, execute,monitor and manage the project with the effective utilization of resources such as men, material, machine and money along with time effectively.
- **PEO4** Continue to learn and adapt to suit the needs and challenges of real-world problems and come up with optimal solutions.

Programme Outcomes (POs)

- **Engineering knowledge**: Apply the knowledge of mathematics, science,**PO1** engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that **PO3** meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, **PO4** analysis and interpretation of data, and synthesis of the information to provide valid conclusions. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and **PO5** modeling to complex engineering activities with an understanding of the limitations. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and **PO6** the consequent responsibilities relevant to the professional engineering practice. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental **PO7** contexts, and demonstrate the knowledge of, and need for sustainable development. Ethics: Apply ethical principles and commit to professional ethics and **PO8** responsibilities and norms of the engineering practice. Individual and team work: Function effectively as an individual, and as **PO9** a member or leader in diverse teams, and in multidisciplinary settings. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such PO10 as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply PO11 these to one's own work, as a member and leader in a team, to manage

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

projects and in multidisciplinary environments.

Program Specific Outcomes (PSOs)

PSO1 Ability to apply the knowledge of Civil Engineering domains, conduct experiments, analyze, interpret data and design the system components.

Enrich the knowledge in Structural, Geo technical, Transportation, Environmental Engineering, Water Resources, Infrastructure and

PSO2 Development, Surveying and Geo-informatics by means of innovative practices.

Competency to plan, produce detailed drawings, write specification, prepare cost estimates, selection of materials, schedule work plans,

PSO3 prepare cost estimates, selection execute and value real properties.

B.Tech Minor in

Climate, Health and Environmental Sustainability

Scheme of Teaching and Examinations 2023-27

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (Effective from the academic year 2023 - 24)

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1	PCC	CV1010-1	Sustainable water and Sanitation system	cv	3	0	0	0	3	50	50	100	3
2	PCC	CV1011-1	Environmental Policy and Risk Assessment	CV	3	0	0	0	3	50	50	100	3
3	PCC	CV1012-1	Lifecycle Assessment	CV	3	0	0	0	3	50	50	100	3
4	PCC	CV2110-1	Environmental Data Analysis and Visualization	CV	2	0	2	0	3	50	50	100	3
5	PCC	CV2011-1	Industrial Waste Water Treatment	CV	3	0	0	0	3	50	50	100	3
6	IPCC	CV2012-1	GIS Mapping and Geospatial Analysis	CV	2	0	2	0	3	50	50	100	3
				Total	16	0	4	-	18	300	300	600	18

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3.	Evaluate the reliability ar	nd co	ost-e	effec	tiver	ness	of v	ario	us w	/aste	wate	er trea	atmer	nt sys	stems	5
4.	Explain the mechanisms													,		
	and the design considera		-	-		-			-					2	-	
5.	Comprehend the princip															
	technical, economic, and	env	viron	men				atior	ns as	ssoci	ated	with	these	e pra	ctices	5.
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2.	Arceivala S.J. and Asolekar S.R. Wastewater Treatment for Pollution Control and Reuse, Tata
	McGraw Hill.
REFER	ENCE BOOKS:
1.	Cites R.W., Middlebrooks E.J. and Reed S.C. Natural Wastewater Treatment Systems, CRC
	Taylor and Francis.
2.	Cairncross S. and Feachem R. <i>Environmental Health Engineering in the Tropics</i> , John Wiley &
	Sons.
3.	Metcalf and Eddy, Wastewater Engineering- Treatment and Reuse (Revised by
	Tchobanoglous, G., Burton, F. L. and Stensel, H. D.), Tata McGraw Hill.

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2.	Apply knowledge of er	nviron	ment	tal le	gislatio	n to c	ase st	udies	to determi	ne	
	jurisdiction and approa	ach									
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3.	Evaluate current enviro			OIICI	es and o	leterr	nine v	vnetn	er tney are	adequ	ate
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TEXT	BOOKS:
1.	Environmental Policy and Public Health, 2nd edition Barry L. Johnson and Maureen Y. Lichtveld, CRC Press, 2017 ISBN 978-1498799393.
2.	"Environmental Policy: New Directions for the Twenty-First Century" by Norman J. Vig and Michael E. Kraft
REFE	RENCE BOOKS:
1.	"Risk Management in the Outdoors: A Whole-of-Organisation Approach for Education, Sport and Recreation" by Neil Carr and Brent Moyle.

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REFER	ENCE BOOKS:
	Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd.2 nd Edn, 2016
2.	Varma and Agarwal, Theory & amp; practice of Management Forward Book Depot, New Delhi.

Car						515 A	ND	VIS	UAL					
LOL	urse Code:			CV2	2110-1				Co	ourse	е Тур	e:	PCC	
Теа	ching Hours/Week (L: T:	P: S):	,	3:0:	0:0					C	credit	ts:	03	
Tot	al Teaching Hours:			40				C	(E +	SEE	Mark	cs:	50+	50
Pre	requisite			CV1	.010-1									
	Теас	ching D)epa	artm	ent: C	ivil Er	ngin	eeri	ng					
Cour	se Objectives: This Course v	vill ena	ble s	stud	ents to									
1.	Collect and pre-process er	nvironn	nent	al d	ata fro	m var	ious	soui	rces,	ensu	ring d	lata	qualit	y anc
2.	Create informative and v	isually	арр	ealir	ng dat	a visu	aliza	ation	s to	effe	tively	/ coi	mmui	nicate
	environmental trends and													
3.	Apply machine learning te	•		0			nsig	hts f	rom	envir	onme	ental	data	, such
4.	as identifying correlations, Develop interactive data						ba	vicu	alizat	ions	for	ovn	orino	
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5.	Ethically present and con				vironm	ental	dat	a an	id ar	nalysi	s res	ults	to d	iverse
	audiences, emphasizing th	ne impli	icati	ons	and sig	gnifica	ince	of tł	ne fin	ding	s.			
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REFER	ENCE BOOKS:
1.	"Environmental Data Analysis with MatLab" by William Menke and Joshua Menke
2.	"Fundamentals of Data Visualization" by Claus O. Wilke

Cou	ırse Code:	CV2	2111-1			Co	urse Typ	be:	PCC	
Теа	ching Hours/Week (L: T: P: S):	3:0:	0:0				Credi	ts:	03	
	al Teaching Hours:	40				CIE + S	SEE Mar	ks:	50+	50
	requisite	CV1	.010-1							
	Teaching	Departm	nent: Civ	vil Enc	ineeri	na				
Cour	se Objectives: This Course will en	-			•	5				
1.	To understand the effect of indu			n strea	ams.					
2.	To explain various primary treat	ment uni	t onerati	ons						
<u>2.</u> 3.	To explain secondary, tertiary ar				faacih	ility				
<u>.</u>	To explain various treatment fac									
. 5.	To understand the design techn						astment	unit		
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	stewater and difference with respec	• •								
	vage Treatment Plants. Stream Sa									
	tewater Stream Quality, Dissolved		-	-	-			Cint	01 111	aastin
	ary treatment of Industrial Waste		ug curv		licum				05	Hours
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	CV2111.3	1	2	1	-	-	2	3	2	-	-	-	-	1	3	-
	CV2111.4	1	1	-	-	-	2	3	1	-	-	-	-	1	3	-
	CV2111.5	1	2	3	-	-	2	3	2	-	-	-	-	1	3	2
1: Low	2: Medium 3: High															
TEXTB	BOOKS:															
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	New York.															
2.	Eckenfelder, "Industrial \	Nate	er po	olluti	on (Cont	rol"	-Mc(Graw	/ hill	Com	pany	, Nev	w Del	hi	
	American Chemical Soci	ety,	Was	hinc	Iton	D.C	. US	A 7.	Bior	eme	diati	on bo	ooks			
		,														
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2.	Azad N. S.,–"Industrial W															
3.	Metcalf and Eddy, "W Publications, 2003.	aste	Wa	ater	Tre	atm	ent,	Dis	posa	al a	nd F	leuse	е", Та	ata N	/IcGra	aw Hill
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5.	Ross R.D. "Industrial Wa	ste [Dispo	osal"	, Re	inhc	old E	nviro	onm	enta	al Ser	ies –I	New	York.		
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E Boo	ks / MOOCs/ NPTEL															
1.	https://nptel.ac.in/cours	es/1	051(0409	9/2											
2.	https://nptel.ac.in/cours	es/1	0510	0409	9/4											
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4.	https://nptel.ac.in/cours	es/1	051(0409	9/2)										

	GIS Mapping	g and Geosp	atial Analysis	
Cou	Irse Code:	CV2012-1	Course Type:	IPCC
Теа	ching Hours/Week (L: T: P: S):	2:0:2:0	Credits:	01
Tot	al Teaching Hours:	40	CIE + SEE Marks:	50+50
I	Teaching D	epartment: Civil	Engineering	
Cour	se Objectives: This Course will ena	ble students to		
1.	Explain the basic principles of GIS			
2.	Summarize the concepts of Vecto	r and Raster data		
3.	Explain the components of GIS			
4.	Study the GPS techniques			
5.	Explains the concepts of GIS and	applications		
		UNIT-I		
Con	cepts Geographic Information S	System		15 Hours
Shap repre	epts of Geodesy, Maps and Transfor e of earth, Georeferencing systems,			
-	esentations of earth, coordinate ref ographic map, scale of a map. Geom rtion, preserving map properties, Un	ference systems, netric transformat	GCS and PCS. Map, feature tion, map projection and type	es of a map,
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Vecto Vecto error meas Raste Raste	graphic map, scale of a map. Geom rtion, preserving map properties, Un	ference systems, netric transformat iversal Transverse UNIT-II lysis data input, map editing. Vector uery, pattern anal pes, data struct transformations, , map calculator,	GCS and PCS. Map, feature tion, map projection and type e Mercator (UTM) projection. digitizing procedures, topolo data analysis, buffering, over ysis. ture and compression, qua resampling. Surface represent reclassification, local-neighbo	es of a map es, projection 13 Hours ogy building day, distance d tree data tation, DEMs
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Introduction, basics of GIS- definition of GIS, components of GIS, GIS work flow, representing spatial data, raster and vector data.

Coordinate systems and map projections, datums, spatial data input, Non spatial data Brief introduction to measurements in GIS.

Global Positioning System, The 3 segments of GPS, How GPS Works, Triangulation, Sources of GPS Error, GPS Terminology, Applications

Tutorial component: Creating features in terms of points, line and polygons, feature editing, adding attributes – adding coordinates, length, area calculation, vector functions – Join, splitting, merging, dissolve, clip, difference, spatial query.

	Explain the concepts of G	SIS														
	Interpretation of RASTER		l Ve	ctor												
	Explain the components	of G	IS													
	Understand the photogra	amn	netri	c teo	chnic	que										
	Explain the application o	f GIS	5													
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	CV2012.3	2	1	2	1	-	-	-	-	-	-	-	1	1	2	1
	CV2012.4	2	1	2	1	-	-	-	-	-	-	-	1	1	2	1
	CV2012.5	2	1	2	1	2	-	-	-	-	-	-	1	1	2	1
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1.	Lillesand T.M., and R.W. Wiley & Sons – 2012.						5			5						n, Jo
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