DEPARTMENT OF CIVIL ENGINEERING

ANNA UNIVERSITY, CHENNAI

OUR VISION:

Department of Civil Engineering, Anna University, shall strive hard to develop and impart technical knowledge and professional skills required for Civil Engineering practice through excellence in teaching, research and consultancy to address sustainable infrastructure development needs at local, national and International levels.

OUR MISSION:

Department of Civil Engineering, Anna University shall contribute to technological and social development by

1. Providing a firm scientific and technological base in Civil Engineering to achieve self-reliance.
2. Providing quality education through innovation in teaching practices at par with global standards.
3. Nurturing leadership and entrepreneurship qualities with ethical values.
4. Developing and disseminating latest knowledge and technologies in emerging areas ofCivil Engineering.
5. Sharing intellectual resources and infrastructure facilities through collaborative partnership.
6. Ensuring supporting conditions for enhancing the employability skills.

ANNA UNIVERSITY, CHENNAI

UNIVERSITY DEPARTMENTS

REGULATIONS - 2023

CHOICE BASED CREDIT SYSTEM

M.TECH.OCEAN TECHNOLOGY (FULL-TIME)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates of the Programme M. Tech. Ocean Technology will

PEO1	Gain knowledge and skills in Ocean Technology which will enable them to have a Successfulcareer and Professional accomplishment in Academy, Public or Private Sector Organizations
PEO2	Become successful consultants in Ocean Technology and handle Turbulent Ocean, Climate Change, Environmental Policies, Marine Environmental Impact Assessment, Design and Constructionin Marine Environment.
PEO3	Contribute to the enhancement of knowledge in Ocean Technology by performing Quality research in institutions of international repute or in Research organizations or Academia.
PEO4	Practice the profession with Good communication, Leadership, Challenges, Ethics and Social Responsibility and formulate solutions that are technically sound, economically feasible, and socially acceptable.
PEO5	Function in multi-disciplinary teams in national and international level and adapt to evolving technologies through life-long learning and innovation.

PROGRAMME OUTCOMES (POs):

After going through the Two years of study, M.Tech Ocean Technology Graduates will exhibit ability to:

PO#	Graduate Attribute	Programme Outcome
PO1	Research Aptitude	An ability to independently carry out research / investigation and development work to solve practical problems
PO2	Technical documentation	An ability to write and present a substantial technical report/document
PO3	Technical competence	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
PO4	Engineering knowledge, Critical analysis and Design	Demonstrate in-depth knowledge of Ocean Engineering with ability to evaluate and analyze the marine processes for the design of marine structures that are technically feasible and socially acceptable.
PO5	Development of Technological Solutions and innovations.	An ability to apply various advanced tools and technologies to develop efficient/innovative Soft and Hard solutions/ measures for Ocean and Coastal problems.
PO6	Environment monitoring and sustainability	An ability to apply relevant/ emerging technologies for Marine environment monitoring and apply/develop environmental strategies, policies and programmes that promote sustainable development of ocean and coastal resources.

Attested

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PEO / PO MAPPING:

PEO's	PO1	PO2	PO3	PO4	PO5	PO6
I	3	3	3	3	2	3
II	3	3	3	2	2	3
III	3	2	3	3	3	2
IV	3	2	3	2	3	2
V	2	2	2	3	2	2

• 1-low, 2-medium, 3-high

MAPPING OF COURSE OUTCOME AND PROGRAMME OUTCOME

		Course Name	PO1	PO2	PO3	PO4	PO5	PO6
YEAR I	SEMESTER I	Advanced Numerical Methods						
		Oceanography	3	2	3	2	2	3
		Wave Hydrodynamics	2	3	2	3	3	3
		Marine and Coastal Resources Management	3	3	3	2	3	3
		Marine Pollution Monitoring and Management	3	2	2	3	3	2
		Research Methodology and IPR						
	SEMESTER II	Coastal Engineering	3	3	3	3	2	2
		Satellite Oceanography and GIS	3	2	2	2	3	2
		Marine Surveying and Instrumentation	2	2	3	3	3	3
		Offshore Engineering	2	3	2	3	2	2
		Port and Harbour Engineering	2	2	3	2	2	
		Professional Elective I						
		Coastal Modelling Laboratory	3	2	2	2	2	2
		Integrated Coastal Management Laboratory	2	2	2	2	3	3
YEAR II	SEMESTER III	Professional Elective II						
		Professional Elective III						
		Professional Elective IV						
		Practical Training (4 weeks)	3	3	3	3	3	3
		Project work I	3	3	3	3	3	3
	SEMESTER IV	Project Work II	3	3	3	3	3	3

• 1-low, 2-medium, 3-high

MAPPING OF PROFESSIONAL ELECTIVE COURSES [PEC]

S. No	Course Name	PO1	PO2	PO3	PO4	PO5	PO6
1.	Modeling of Coastal Processes	3	2	2	3	2	2
2.	Coastal Ecosystem and Biodiversity	2	2	2	2	2	3
3.	Fisheries and Aquaculture Technology	3	2	2	2	3	2
4.	Global Climate Change and Oceans	2	3	2	3	2	2
5.	Marine Toxicology	2	2	2	2	2	2
6.	EIA and Ocean Governance	2	3	2	2	2	3
7.	Integrated Coastal Zone Management	2	2	3	3	3	2
8.	Socio-economic aspects of Coastal Management	2	2	2	2	2	2
9.	Coastal Hazards and Management	2	2	3	3	3	2
10.	Deep Sea Technology	2	2	2	3	2	2
11.	Ocean Renewable Energy	2	2	2	3	3	3
12.	Marine Geotechnology	2	2	2	3	2	2
13.	Sustainable Blue Economy	2	3	2	2	2	3

• 1-low, 2-medium, 3-high

ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
M.TECH. OCEAN TECHNOLOGY (FULL-TIME)
REGULATIONS – 2023
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABUS FOR I TO IV SEMESTERS

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA3155	Advanced Numerical Methods	FC	4	0	0	4	4
2.	OT3101	Oceanography	PCC	3	0	0	3	3
3.	OT3102	Wave Hydrodynamics	PCC	3	0	2	5	4
4.	OT3103	Marine and Coastal Resources Management	PCC	3	0	0	3	3
5.	OT3104	Marine Pollution Monitoring and Management	PCC	3	0	4	7	5
6.	RM3151	Research Methodology and IPR	RMC	2	1	0	3	3
			TOTAL	**18**	**1**	**6**	**25**	**22**

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	OT3201	Coastal Engineering	PCC	3	0	0	3	3
2.	OT3202	Satellite Oceanography and GIS	PCC	3	0	4	7	5
3.	OT3203	Marine Surveying and Instrumentation	PCC	3	0	0	3	3
4.	OT3204	Offshore Engineering	PCC	3	0	0	3	3
5.	OT3205	Port and Harbour Engineering	PCC	3	0	0	3	3
6.		Professional Elective I	PEC	3	0	0	3	3
PRACTICALS								
7.	OT3211	Coastal Modelling Laboratory	PCC	0	0	4	4	2
8.	OT3212	Integrated Coastal Management Laboratory	PCC	0	0	2	2	1
			TOTAL	**18**	**0**	**10**	**28**	**23**

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SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Professional Elective II	PEC	3	0	0	3	3
2.		Professional Elective III	PEC	3	0	0	3	3
3.		Professional Elective IV	PEC	3	0	0	3	3
PRACTICALS								
4.	OT3311	Practical Training (4 weeks)	EEC	0	0	0	0	2
5.	OT3312	Project Work I	EEC	0	0	12	12	6
			TOTAL	**9**	**0**	**12**	**21**	**17**

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	OT3411	Project Work II	EEC	0	0	24	24	12
			TOTAL	**0**	**0**	**24**	**24**	**12**

TOTAL CREDITS TO BE EARNED FOR AWARD OF THE DEGREE:74 CREDITS

FOUNDATION COURSES (FC)

S. No	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	MA3155	Advanced Numerical Methods	4	0	0	4	1
					Total Credits	**4**	

PROFESSIONAL CORE COURSES (PCC)

S. No	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	OT3101	Oceanography	3	0	0	3	1
2.	OT3102	Wave Hydrodynamics	3	0	2	4	1
3.	OT3103	Marine and CoastalResources Management	3	0	0	3	1
4.	OT3104	Marine Pollution Monitoring and Management	3	0	4	5	1
5.	OT3201	Coastal Engineering	3	0	0	3	2
6.	OT3202	Satellite Oceanography and GIS	3	0	4	5	2
7.	OT3203	Marine Surveying and Instrumentation	3	0	0	3	2
8.	OT3204	Offshore Engineering	3	0	0	3	2
9.	OT3205	Port and Harbour Engineering	3	0	0	3	2
10.	OT3211	Coastal Modelling Laboratory	0	0	4	2	2
11.	OT3212	Integrated Coastal Management Laboratory	0	0	2	1	2
					TOTAL CREDITS	**35**	

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PROFESSIONAL ELECTIVE COURSES

S. No	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS
			Lecture	Tutorial	Practical	
1.	OT3001	Modelling of Coastal Processes	3	0	0	3
2.	OT3002	Coastal Ecosystem and Biodiversity	3	0	0	3
3.	OT3003	Fisheries and Aquaculture Technology	3	0	0	3
4.	OT3004	Global Climate Change and Oceans	3	0	0	3
5.	OT3005	Marine Toxicology	3	0	0	3
6.	OT3006	EIA and Ocean Governance	3	0	0	3
7.	OT3007	Integrated Coastal Zone Management	3	0	0	3
8.	OT3008	Socio-Economic Aspects of Coastal Management	3	0	0	3
9.	OT3009	Coastal Hazards and Management	3	0	0	3
10.	OT3010	Deep Sea Technology	3	0	0	3
11.	OT3011	Ocean Renewable Energy	3	0	0	3
12.	OT3012	Marine Geotechnology	3	0	0	3
13.	OT3013	Sustainable Blue Economy	3	0	0	3

RESEARCH METHODOLOGY AND IPR COURSES (RMC)

S. No	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	RM3151	Research Methodology and IPR	2	1	0	3	1
					Total Credits:	**3**	

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	OT3311	Practical Training	0	0	0	2	3
2.	OT3312	Project Work I	0	0	12	6	3
3.	OT3411	Project Work II	0	0	24	12	4
					Total Credits:	**18**	

SUMMARY

S. No	NAME OF THE PROGRAMME : M. TECH OCEAN TECHNOLOGY					
	SUBJECT AREA	CREDITS PER SEMESTER				CREDITS TOTAL
		I	II	III	IV	
1.	FC	4	00	00	00	4
2.	PCC	15	20	00	00	35
3.	PEC	00	03	09	00	12
4.	RMC	03	00	00	00	03
5.	EEC	00	00	08	12	20
	TOTAL CREDITS	**22**	**23**	**17**	**12**	**74**

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MA3155 ADVANCED NUMERICAL METHODS L T P C
4 0 0 4

UNIT I ALGEBRAIC EQUATIONS 12

Systems of linear equations: Gauss Elimination method, pivoting techniques, Thomas algorithm for tridiagonal system – Jacobi, Gauss Seidel, SOR iteration methods - Systems of nonlinear equations: Fixed point iterations, Newton Method, Eigenvalue problems: power method, Faddeev – Leverrier Method.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS 12

Runge Kutta Methods for system of IVPs, numerical stability, Adams-Bashforth multistep method, solution of stiff ODEs, shooting method, BVP: Finite difference method, collocation method, orthogonal collocation method, Galerkin finite element method.

UNIT III FINITE DIFFERENCE METHOD FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATION 12

Parabolic equations: explicit and implicit finite difference methods, weighted average approximation - Dirichlet and Neumann conditions – Two dimensional parabolic equations – ADI method; First order hyperbolic equations – method of characteristics, Lax - Wendroff explicit and implicit methods; numerical stability analysis, method of lines – Wave equation: Explicit scheme-Stability of above schemes.

UNIT IV FINITE DIFFERENCE METHODS FOR ELLIPTIC EQUATIONS 12

Laplace and Poisson's equations in a rectangular region: Five point finite difference schemes, Leibmann's iterative methods, Dirichlet and Neumann conditions – Laplace equation in polar coordinates: finite difference schemes – approximation of derivatives near a curved boundary while using a square mesh.

UNIT V FINITE ELEMENT METHOD 12

Partial differential equations – Finite element method - collocation method, orthogonal collocation method, Galerkin finite element method.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Get familiarized with the methods which are required for solving system of linear, nonlinear equations and eigenvalue problems.
CO2: Solve the BVPs and the system of IVPs by appropriate methods discussed.
CO3: Solve time dependent parabolic PDEs by using various methodologies up to dimension two.
CO4: Solve elliptic equations by finite difference methods.
CO5: Use the ideas of solving PDEs by finite element method.

REFERENCES:

1. Burden, R.L., and Faires, J.D., "Numerical Analysis – Theory and Applications", Cengage Learning, India Edition, New Delhi, 2010.
2. Gupta S.K., "Numerical Methods for Engineers", New Age Publishers, 3rd Edition, New Delhi, 2015.
3. Jain M. K., Iyengar S. R. K., Jain R.K., "Computational Methods for Partial Differential Equations", New Age Publishers, 2nd Edition, New Delhi, 2016.
4. Morton K.W. and Mayers D.F., "Numerical solution of partial differential equations", Cambridge University press, Cambridge, 2005.
5. Sastry S.S., "Introductory Methods of Numerical Analysis", Prentice - Hall of India Pvt. Limited, 5th Edition, New Delhi, 2012.
6. Saumyen Guha and Rajesh Srivastava, "Numerical methods for Engineering and Science", Oxford Higher Education, New Delhi, 2010.

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