

# Scheme of Studies & Syllabus

**Master of Technology  
Civil Engineering  
2021-22**



**Department of CEE**

**SCHOOL OF ENGINEERING & TECHNOLOGY**



**THE NORTHCAP UNIVERSITY, GURGAON**

**(Established under Haryana Govt. Notification No. Leg. 32/2006-HARYANA ACT No.25 of 2009)**

## **Department of Civil & Environmental Engineering**

The department of Civil & Environmental Engineering offers the following programmes during the academic year 2021-22.

- Master of Technology (M.Tech.) in Civil Engineering with specialization in
  - Structural Engineering
  - Construction Engineering & Management and
  - Environmental Engineering

M.Tech. in Civil Engineering programme for working professional will impart research based knowledge in the selected disciplines of civil engineering. The programme will be of 3 years with 6 semesters for working professional under part time. The programme has total credits of 57. The curriculum is designed in such a way that there are subjects relevant to overall civil engineering and specialization based seminar, minor project, and dissertation in structural engineering, Construction engineering and Management, and Environmental engineering. Students can opt for any one of these specializations by taking the seminar, minor project and dissertation in those specializations.

### **PROGRAMME OUTCOMES**

- Attain in-depth knowledge of the specialization with an ability to demonstrate the same to solve real life practical problems.
- Independently carry out research and development work in the key areas of the specialization.
- Able to identify and analyse the impact of specialization in development projects and find a suitable sustainable solution
- Conceptualize and apply appropriate techniques, resources and modern engineering tools in solving multidisciplinary problems.

### **PROGRAMME SPECIFIC OUTCOMES (PSOs)**

- Ability to apply knowledge in respective specialized area for proposing methods and solution for different types of problems and challenges.
- To understand modern and latest technologies and apply the conceptualized knowledge in the respective area of specialization.



**Department of CEE**  
**M. Tech in Civil Engineering**  
 (with specialization in Structural Engineering / Construction Engineering and Management/ Environmental Engineering)  
**2021**

Semester	Course Code Course Name			Lecture Course	L	T	P	Week Cont. Hrs	Credits	
I	CEL501 Sustainable Built Environment 2-1-0 (3)	CEL511 Advanced Foundation Engg 2-1-0(3)	CEL505 Optimization Techniques in Civil Engineering 2-1-0 (3)	CEP501 Laboratory Training, I 0-0-4 (2)	3	6	3	4	13	11
II	CEL503 Safety and Reliability Analysis 2-1-0 (3)	CEL504 Advanced Concrete Technology 2-1-0 (3)	CEL512 Construction Planning Cost Dynamics and Management 2-1-0 (3)	CEP502 Laboratory Training, II 0-0-4 (2)	3	6	3	4	13	11
III	CEL502 EI&RA 2-1-0 (3)	OE-1 2-1-0 (3)	CEC501 Seminar (Specialization based) 0-0-2 (1)		2	4	2	2	8	7
IV	MAL616 Research Methodology 2-1-0 (3)	CEL514 Technical Writing Skills 2-0-0 (2)	CED 512 Minor Project (Specialization based) 0-0-8 (4)		2	4	1	8	13	9
V	OE-2 2-1-0 (3)	CED601 Dissertation Part-I (Specialization based) 0-0-12 (6)			1	2	1	12	15	9
VI	CED602 Dissertation Part-II (Specialization based) 0-0-20(10)				0	0	0	20	20	10
				<b>Total</b>						<b>57</b>

\*Open electives can be chosen from the list of Open Elective courses offered by the University. These may be run as Regular or MOOC (full/blended).

## M. Tech (Civil Engineering)

### **CEL501 Sustainable Built Environment**

3 Credits (2-0-2)

Background terms; Smart Growth, smart city and New Urbanism and the Resistance to Change; Green Building Assessment; Green Building Index; Life Cycle Costing; The Setting/Green Roofs, Case Study; Energy and Buildings; Energy and Hydrologic Systems; Materials/Specifications; Interior Environments (lighting, air), GRIHA, LEEDs rating system, BEE Standards and guidelines.

### **CEL502 Environmental Impact & Risk Assessment**

3 Credits (2-0-2)

Planning and Management of Environmental Impact Studies. Impact indentation methodologies: base line studies, screening, scooping, checklist, networks, overlays. Prediction and assessment of impacts on the socio-economic environment. Environmental cost benefit analysis. Decision methods for evaluation of alternatives. Case Studies. Environmental impact assessment at project level, regional level, sectoral level, and policy level. Sustainable development; Environmental policy in planned, mixed and market economies; global environmentalism. Preventive environmentalism. Preventive environmental management.

### **CEL503 Safety and Reliability Analysis**

3 credits (2-0-2)

Fundamentals of set theory and probability, probability distribution, regression analysis, hypothesis testing. Stochastic process and its moments and distributions, Concepts of safety factors, Safety, reliability and risk analysis, first order and second order reliability methods, simulation based methods, confidence limits and baysean revision of reliability, reliability based design, examples of reliability analysis of structures

### **CEL504 Advanced Concrete Technology**

3 Credits (2-0-2)

Concrete Making Materials Aggregates – Classification, IS specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates. Cement Chemical composition, Hydration of cement, structure of hydrated cement, special cements, and water chemical admixtures. Concrete

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and Shrinkage, Variability of concrete strength. Mix Design Principles of concrete mix design, Methods of concrete mix design, testing of concrete. Special Concretes Light weight concrete, Fiber reinforced concrete, Polymer concrete, Super plasticized concrete, Properties and applications. Concreting Methods Process of manufacturing of concrete. Methods of Transportation, placing and curing. Extreme weather concreting, special concreting methods.

### **CEL505 Optimization Techniques in Civil Engineering**

3 Credits (2-0-2)

Optimization Introduction – Formulation of LPP – Geometry of LPP and Graphical Solution of LPP – Solution of LPP: Simplex Method – Big M Method – Two Phase Method – Special cases in simple applications – Introduction to Duality Theory – Dual Simplex Method – Optimization of Transportation Problems – Project Management – Path Analysis

### **CEL511 Advanced Foundation Engineering**

Introduction to Foundation Engineering, Soil Exploration, Classification of foundations, Bearing Capacity Theories, Scale Effect, Eccentrically loaded footing, Bearing capacity of- Interfering footings, Anisotropic foundations, Centric inclined load, Oblique loading, Design of Shallow Rigid Foundations, Flexible Design of Foundations: Beams on Elastic Foundation, Finite Difference Schemes and Expressions for various applied loadings and moments, Settlement and Contact pressures, Pile Foundations

### **CEL512 Construction Planning, cost dynamics and Management**

Construction Technology and planning, Construction Economics and finance, Construction Management, Construction Health and Safety, Project Management.

**MAL 616 Research Methodology**

3 credits (2-1-0)

Foundations of Research, Scientific Research, Motivation, Research Objectives, Research Designs, Research Processes, Understanding Feasibility of Objectives and Processes, Qualitative and Quantitative Research Methods, Data Collection Processes, Biases in Data Collection, Data Pre-processing, Sampling Distribution and Confidence Intervals, Hypothesis Testing, Interpretation of Results, Literature Review, Technical Writing, Citations, Reference management software, Plagiarism, Software for Detection of Plagiarism.

**CEL514 Technical Writing skills**

Types of technical writing, definition writing and analysis of material, description of mechanisms and processes, library resources, research techniques, and proposal writing, collecting notes, writing outlines, and writing rough drafts, the elements of the formal research report, graphic aids in technical reports, grammar, technical writing style, and paper revision, plagiarism and professional ethics.

**CEC532 Seminar**

2 Credits (0-2-0)

Independent study on any recent research area in the domain of Civil Engineering as per the specialization chosen by the student. Research papers on specialized topics will be collected from journals and presented. A report shall be submitted showing the literature reviewed by the student.

**CED534 Minor project**

4 credits

The minor project will be a design project (hardware/software) on a topic suggested by the course coordinator to be completed during the designated duration. It may be of practical and theoretical interest. It has to be done under the guidance of a faculty and students are expected to complete literature survey, feasibility testing, develop or implement the research work.

**CEP501 Laboratory Training I**

2 Credits

This is a lab/practical course and the lab experiments of core courses running in that semester will be conducted under this laboratory training.

**CEP502 Laboratory Training II**

2 Credits

This is a lab/practical course and the lab experiments of core courses running in that semester will be conducted under this laboratory training.

**CED601 Dissertation Phase-I**

6 Credits (0-0-12)

Part-I of the project will cover the problem identification along with the assigned supervisor in the area of specialization followed by literature review, data collections and data generations and identification of the tool of analysis, simulation and modeling and hypothesis for the problem solving.

**CED602 Dissertation Phase-II**

12 Credits (0-0-24)

Part-II of the project will cover the actual simulation, modeling, result generation and reaching to the desired goal set in Part-I