

Minor List courses (2018 Batch onwards)

- 1.This is applicable from 2018 batch of B.Tech./Dual Degree.
- 2.The minor is awarded based on doing four courses (minimum 36 credits) with in the approved stream titles and courses only.
- 3.Can do two minors without over lapping courses.
- 4.Students cannot claim minor in major degree.
- 5.A course cannot be claimed under two minor.

Dept.	Title	Course No	Course Name
BT	Bioprocess Engineering (Applicable for BT (BE/BS) students also	Core Course:	
		BT5071	Bioreactor Design and Analysis
		At least three electives from the following list	
		BT5041	Downstream Processing
		BT5210	Bioprocess Control
		BT5021	Metabolic Engineering
		BT5031	Thermodynamics in Biochemical Engineering
		BT5040	Advanced Bioprocess Technology
		BT5051	Transport Phenomena in Biological Systems
		BT5121	Bioprocess Engineering Lab II
		BT5260	Plant Cell Bioprocessing
		BT5370	Fermentation Technology
		BT5450	Data-driven Modeling and Optimization of Bioprocesses
		CH5020	Statistical Design and Analysis of Experiments
		CH5140	Process Analysis and Simulation
		CH5120	Modern Control Theory
		CH5440	Multivariate Data Analysis for Process Modeling
		CH5460	Unit Operation and Processes in Env.Engg.
		CH5520	Mathematical Methods for Chemical Engineers
		BT6240	Bioprocess Modeling and Simulation
CH6531	Multiscale Modeling of Heterogenous Catalytic Systems		
-	Other relevant coures after approval from Dept. of Biotechnology		
CE	Air Quality Management	CE5180	Air Pollution and Control Engineering
		CE5150	Environmental Chemistry and Microbiology
		CE5260	Models for Water and Air Quality
		CE5015	Environmental Monitoring and Data Analysis
		CE4011	Introduction to Atmospheric and Climate Sciences
		CE5971	Aerosol Science and Technology
		CE5017	Urban Transport and the Environment
	Climate Sciences	CE5235	Understanding climate dynamics and its mysteries
		CE4011	Introduction to Atmospheric and Climate Sciences
		ME5127	Introduction to Atmospheric Science
		ME3620	Introduction to Energy and Environment
		CH5370	Environmental Quality Monitoring and analysis
		CE5971	Aerosol Science and Technology
		CE5450	Applied Hydraulic Engineering
	Computational Hydraulics	CE6520	Simulation Modelling in Water Resources
		CE6480	Contaminant Transport Modelling
		CE5460	Ground Water Engineering
		AM5630	Foundation of Computational Fluid Dynamics
		CH2061	Computational Techniques
		CE3330	Computer methods in Civil Engineering
CE5225		Numerical Techniques in Civil Engineering	
Polymers	CH5190	Introduction to macromolecules	
	CH3160	Polymeric materials	
	CH5130	Rheology of complex Materials	
	CH5270	Polymers for devices	
	ID6070	Mechanics of viscoelastic materials	
	CH5380	Testing of Polymers	
	CH6190	Polymer Reaction Kinetics and Engineering	
	CH5170	Process Optimization	
	CH5120	Modern Control Theory	
	CH5350	Applied Time-Series Analysis	
	CH5230	Data-driven Modelling of Process Systems	

CH	Systems Engineering	CH5440	Multivariate Data Analysis
		CH5470	Graph Theory & Its Applications in Process Design
		CH5019	Mathematical Foundations of Data Science
		CH5490	Integer Optimization
		CH5017	Data analysis for modelling and monitoring of reaction systems
		CH5115	Parameter and State Estimation
	Energy & Environment	CH5013	Principles of fuel cells
		CH5023	Unconventional oil and gas resources
		CH5018	Biomass conversion processes and analysis
		CH3150	Renewable energy sources
		CH4960	The nuclear energy option
		CH6260	Carbon capture and sequestration
		CH5370	Environmental quality and monitoring
	Soft Matter	ID5500	Battery Technology
		CH5190	Introduction to Macromolecules
		CH5014	Interfacial Science and Engineering
		CH5011	Colloids and Surfaces
		CH5021	Molecular Simulation of Soft Matter
CH5130		Rheology of Complex Fluids	
CS	Computing	-	The student is required to complete FOUR CSE Theory or Theory+Lab courses other than CS1100. Note: This minor is open to all B.Tech./DD students except for students of B.Tech./DD in CSE and ID DD in Data Science.
		CS5691	Pattern Recognition and Machine Learning
	Artificial Intelligence and Machine Learning	CS6046	Multi-Armed Bandits
		CS6250	Memory based Reasoning in AI
		CS6300	Speech Technology
		CS6350	Computer Vision
		CS6370	Natural Language Processing
		CS6380	Artificial Intelligence
		CS6680	Planning and Constraint Satisfaction
		CS6700	Reinforcement Learning
		CS6720	Data Mining
		CS6730	Probabilistic Graphical Models
		CS6741	Statistical Foundations of Data Science
		CS6770	Knowledge Representation and Reasoning
		CS6910	Fundamentals of Deep Learning
		CS6886	Systems Engineering for Deep Learning
		CS6852	Theory and Applications of Ontologies
		CS6011	Kernel Methods for Pattern Analysis
HS	Anthropology and Cultural Studies	HS4022	Introduction to Cultural Studies
		HS7550	Critical Theory in the Social Sciences
		HS6580	Indian Cultural Studies
		HS6520	Culture and development
		HS6570	Food Cultures
		HS5855	Memory, History and Literature
	Economics	HS3023	Microeconomics
		HS3021	Macroeconomics
		HS4021	International Economics
		HS4011	Econometrics
		HS5360	Public Economics
		HS5340	Money, Banking and Financial Markets
	Applied Economics	HS2320	Economics of Industrial Organizations
		HS4770	International Trade & Finance
		HS4780	Financial Economics
HS4330		Environment & Resource Economics	
HS6140		Production Economics: Efficiency and Productivity Analysis	
HS4300		Applied Economics	
		HS3017	Introduction to Linguistics

HS	Linguistics	HS6750	Applied Linguistics
		HS5640	Advanced Linguistics
		HS3029	Principles and Parameters in Natural Language
		HS5025	Linguistic Typology
		HS3028	Language and Society in India
		HS5611	English Phonetics and Phonology
		HS7080	Philosophy of Language
		HS8370	Sociolinguistics
	Philosophy	HS1020	Aspects of Western Philosophy
		HS2200/HS4002	Introduction to Indian Philosophy
		HS2300	Ethics
		HS1070	Logic
		HS4031	Symbolic logic
		HS4450	Introduction to European Philosophy
		HS3050	Professional Ethics (with a credit)
		HS7090	Philosophical and Hermeneutics
		HS3033	Philosophy in Literature and Films
		HS4570	Gandhian Thoughts
		HS4510	Political Philosophy
		HS7080	Philosophy of Language
		HS6130	Philosophy of Mind
		Economics (Social and Economic Policy)	HS4280
	HS3031		Technology and Public Policy
	HS6720		Economics of Human Resources
	HS3170		Development Planning and Project Appraisal
	HS4574		Health, Environment and Human Wellbeing
	HS6730		Economics of Healthcare
	HS8420		Health Policy and Planning in Developing Countries
	HS5125		Global Health and Policy
	Global Politics/IR	HS2012	International Relations: Theory and Practice
		HS3022	Conflict, Reconstruction and Human Security
		HS3013/HS5080	Human Rights and Justice
		HS5930	War and Peace in West Asia
		HS3420	China in Contemporary Global Politics
		HS4014	State and Development
HS5880		Corruption and Development	
HS6070		Democracy: Theory and Practice	
MA	Mathematics	-	Students must have successfully completed atleast 4 courses from the list of M.Sc. Mathematics (Core+Electives) courses offered by the department.
MM	Materials Science	MM5680	Smart Materials
		MM5016	Polymers and Colloids: Physics and Applications
		MM5030	Materials in renewable energy technologies
		MM5410	Ceramic Science and Technology
		MM5041	Medical Materials
		MM3010	Physics of Materials
		MM3330	Non-metallic materials
		MM5001	Composite materials
		MM5010	Advanced Engineering Materials
		MM5017	Electronic materials, devices, and fabrication
		MM5003	Atomistic modeling of materials
		MM5700	Topics in Nanomaterials
		MM5040	Defects in Materials
		MM5020	Modern techniques of Materials Characterization
		MM5460	Physical Ceramics
		ID6106	Materials for energy storage and conversion
		ID6050	Chemical Physics of Modern Technical Ceramics
		MM5130	Materials under Extreme Environments
		MM5210	X-ray Diffraction Techniques
PH	Physics	PH3500	Classical Physics
		PH3520	Quantum Physics
		-	Any 2 elective courses at PH5XXX level.