

7. CAPABILITY-LINKED OPTIONS FOR UNDERGRADUATE STUDENTS

As described in Section 4.8, students with CGPA higher than 7.0 and /or earned credits higher than 20 per semester are eligible to register for additional credits towards the following Capability-linked options. They can make use of these additional credits in two blocks of 20 credits to opt for

- (a) Minor/Interdisciplinary Area Specialization
- (b) Departmental Specialization

A student based on his/her performance and interest can choose either one or both. Successful completion of minor area credits and /or Interdisciplinary/Departmental Specialization will be indicated on the degree.

When a student opts for such a specialization and/or a minor area, he/she can use 10 open category (OC) credits (mandatory degree requirement) towards the specialization and/or minor area requirements. For example, a student registered for B.Tech (Chemical Engg.) and opting for minor area in Computer Science, can opt for courses prescribed for the minor area, as part of mandatory 10 credits requirements under OC. He/she will need to do additional 10 credits for completing the Minor area requirements.

A set of pre-defined courses of total 20 credits in a focus area comprises a Departmental Specialization if the courses belong to the parent Department of an undergraduate programme, or a Minor/Interdisciplinary Area Specialization if the courses belong to a different Department/Centre/School. Additional conditions and details are given in this section.

If any course of a Minor / Interdisciplinary area overlaps with any core course (DC or PC category courses) or elective course (DE or PE category courses) of the student's programme, then credits from this course will not count towards the minor area credit requirements, though this course may contribute towards satisfying the requirement of the Minor/Interdisciplinary area. In such a case, the requirement of 20 credits must be completed by taking other courses of the Minor Area or Departmental/Interdisciplinary specialization. A student interested in opting for a Capability-linked option can register for the same online, on a first-come first served basis, after he/she completes at least 2 courses, preferably the core courses (wherever applicable) of the Minor Area/Interdisciplinary/Departmental Specialization being applied for.

Minor Area in Atmospheric Sciences (Centre for Atmospheric Sciences)

Minor Area Core

ASL310	Fundamentals of Atmosphere and Ocean	3	0	2	4
ASL320	Climate Change: Impacts, Adaptation and Mitigation	3	0	2	4
Total Credits					8

Minor Area Electives

ASD330	Mini Project	0	0	12	6
ASL410	Numerical Simulation of Atmospheric and Oceanic Phenomena	3	0	2	4
ASL733	Physics of the Atmosphere	3	0	0	3
ASL734	Dynamics of the Atmosphere	3	0	0	3
ASL735	Atmospheric Chemistry and Air Pollution	3	0	0	3
ASL736	Science of Climate Change	3	0	0	3
ASL737	Physical and Dynamical Oceanography	3	0	0	3
ASL750	Boundary Layer Meteorology	3	0	0	3
ASL752	Mesoscale Meteorology	3	0	0	3
ASL753	Atmospheric Aerosols	3	0	0	3
ASL754	Cloud Physics	3	0	0	3
ASL755	Remote Sensing of the Atmosphere and Ocean	3	0	0	3
ASL756	Synoptic Meteorology	3	0	0	3
ASL757	Tropical Weather and Climate	3	0	0	3
ASL758	General Circulation of the Atmosphere	3	0	0	3
ASL759	Land-Atmosphere Interactions	3	0	0	3
ASL760	Renewable Energy Meteorology	3	0	0	3
ASL761	Earth System Modelling	3	0	0	3
ASL762	Air-Sea Interaction	3	0	0	3
ASL763	Coastal Ocean and Estuarine Processes	3	0	0	3
ASL822	Climate Variability	3	0	0	3
ASL823	Geophysical Fluid Dynamics	3	0	0	3

Minor Area in Biological Sciences (Kusuma School of Biological Sciences)

Minor Area Core

SBL201	High-Dimensional Biology	3	0	0	3
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SBP200	Introduction to Practical Modern Biology	0	0	4	2
Total Credits					5

Minor Area Electives

SBD301	Mini Project	0	0	6	3
SBL701	Biometry	3	0	0	3
SBL702	Systems Biology	3	0	0	3
SBL704	Human Virology	3	0	0	3
SBL707	Bacterial Pathogenesis	3	0	0	3
SBL708	Epigenetics in Health and Disease	3	0	0	3
SBL705	Biology of Proteins	3	0	0	3
SBL703	Advanced Cell Biology	3	0	0	3
SBL706	Biologics	3	0	0	3
SBL709	Marine Bioprospecting	3	0	0	3
SBL710	Chemical Biology	3	0	0	3

Minor Area in Business Management (Department of Management Studies)

Minor Area Core (All four courses leading to 12 credits)

MSL301	Organizational & People Management	3	0	0	3
MSL302	Managerial Accounting & Financial Management	3	0	0	3
MSL303	Marketing Management	3	0	0	3
MSL304	Managing Operations	3	0	0	3
Total Credits					12

Minor Area Electives (9 credits required)

MSL704	Science & Technology Policy Systems	3	0	0	3
MSL709	Business Research Methods	1.5	0	0	1.5
MSL710	Creative Problem Solving	3	0	0	3
MSL711	Strategic Management	3	0	0	3
MSL712	Ethics & Values Based Leadership	1.5	0	0	1.5
MSL713	Information Systems Management	3	0	0	3
MSL714	Organizational Dynamics and Environment	3	0	0	3
MSL715	Quality and Environment Management Systems	3	0	0	3
MSL716	Fundamentals of Management Systems	3	0	0	3
MSL717	Business Systems Analysis & Design	3	0	0	3
MSL719	Statistics for Management	3	0	0	3
MSL720	Macroeconomic Environment of Business	3	0	0	3

MSL721	Econometrics	3	0	0	3	MSL859	Current and Emerging Issues in IT Mgmt.	3	0	0	3
MSL724	Business Communication	1.5	0	0	1.5	MSL861	Market Research	3	0	0	3
MSL725	Business Negotiations	1.5	0	0	1.5	MSL862	Product Management	3	0	0	3
MSL727	Interpersonal Behavior & Team Dynamics	1.5	0	0	1.5	MSL863	Advertising and Sales Promotion Mgmt.	3	0	0	3
MSL729	Individual Behavior in Organization	1.5	0	0	1.5	MSL864	Corporate Communication	3	0	0	3
MSL730	Managing With Power	1.5	0	0	1.5	MSL865	Sales Management	3	0	0	3
MSL731	Developing Self Awareness	1.5	0	0	1.5	MSL866	International Marketing	3	0	0	3
MSL733	Organization Theory	1.5	0	0	1.5	MSL867	Industrial Marketing Management	3	0	0	3
MSL734	Management of Small & Medium Scale Industrial Enterprises	3	0	0	3	MSL868	Digital Research Methods	1.5	0	0	1.5
MSL740	Quantitative Methods in Management	3	0	0	3	MSL869	Current & Emerging Issues in Marketing	3	0	0	3
MSL780	Managerial Economics	1.5	0	0	1.5	MSL870	Corporate Governance	1.5	0	0	1.5
MSL801	Technology Forecasting & Assessment	3	0	0	3	MSL871	Banking and Financial Services	1.5	0	0	1.5
MSL802	Management of Intellectual Property Rights	3	0	0	3	MSL872	Working Capital Management	3	0	0	3
MSL804	Procurement Management	3	0	0	3	MSL873	Security Analysis & Portfolio Management	3	0	0	3
MSL805	Services Operations Management	3	0	0	3	MSL874	Indian Financial System	1.5	0	0	1.5
MSL806	Mergers & Acquisitions	3	0	0	3	MSL875	International Financial Management	3	0	0	3
MSL807	Selected Topics in Strategic Management	1	0	0	1	MSL876	Economics of Digital Business	1.5	0	0	1.5
MSL808	Systems Thinking	3	0	0	3	MSL877	Electronic Government	1.5	0	0	1.5
MSL809	Cyber Security: Managing Risks	3	0	0	3	MSL878	Electronic Payments	1.5	0	0	1.5
MSL810	Advanced Data Mining for Business Decisions	1.5	0	0	1.5	MSL879	Current & Emerging Issues in Finance	3	0	0	3
MSL811	Management Control Systems	3	0	0	3	MSL880	Selected Topics in Management Methodology	3	0	0	3
MSL812	Flexible Systems Management	3	0	0	3	MSL881	Management of Public Sector Enterprises in India	3	0	0	3
MSL813	Systems Methodology for Management	3	0	0	3	MSL882	Enterprise Cloud Computing	1.5	0	0	1.5
MSL814	Data Visualization	1.5	0	0	1.5	MSL883	ICTs, Development and Business	1.5	0	0	1.5
MSL815	Decision Support and Expert Systems	3	0	0	3	MSL884	Information System Strategy	3	0	0	3
MSL816	Total Quality Management	3	0	0	3	MSL885	Digital Marketing-Analytics & Optimization	3	0	0	3
MSL817	Systems Waste & Sustainability	3	0	0	3	MSL886	IT Consulting & Practice	3	0	0	3
MSL818	Industrial Waste Management	3	0	0	3	MSL887	Mobile Commerce	3	0	0	3
MSL819	Business Process Re-engineering	3	0	0	3	MSL888	Data Warehousing for Business Decision	1.5	0	0	1.5
MSL820	Global Business Environment	3	0	0	3	MSL889	Current & Emerging Issues in Public Sector Management	3	0	0	3
MSL821	Strategy Execution Excellence	3	0	0	3	MSL891	Data Analytics using SPSS	1.5	0	0	1.5
MSL822	International Business	3	0	0	3	MSL892	Predictive Analytics	1.5	0	0	1.5
MSL823	Strategic Change & Flexibility	3	0	0	3	MSL893	Public Policy Issues in the Information Age	1.5	0	0	1.5
MSL824	Policy Dynamics & Learning Organization	3	0	0	3	MSL894	Social Media & Business Practices	3	0	0	3
MSL825	Strategies in Functional Management	3	0	0	3	MSL895	Advanced Data Analysis for Management	3	0	0	3
MSL826	Business Ethics	3	0	0	3	MSL896	International Economic Policy	3	0	0	3
MSL827	International Competitiveness	3	0	0	3	MSL897	Consultancy Process & Skills	3	0	0	3
MSL828	Global Strategic Management	3	0	0	3	MSL898	Consultancy Professional Practice	3	0	0	3
MSL829	Current & Emerging Issues in Strategic Management	3	0	0	3	MSL899	Current & Emerging Issues in Consultancy Management	3	0	0	3
MSL830	Organizational Structure and Processes	3	0	0	3	MTL732	Financial Mathematics	4	3	1	0
MSL831	Management of Change	3	0	0	3	Minor Area in Computational Mechanics (Department of Applied Mechanics)					
MSL832	Managing Innovation for Organizational Effectiveness	3	0	0	3	Minor Area Electives					
MSL833	Organizational Development	3	0	0	3	APD311	Project	0	0	8	4
MSL834	Managing Diversity at Workplace	1.5	0	0	1.5	APL300	Computational Mechanics	3	0	2	4
MSL835	Labor Legislation and Industrial Relations	3	0	0	3	APL310	Constitutive Modelling	3	0	2	4
MSL836	International Human Resources Management	1.5	0	0	1.5	APL340	Chaos	3	0	2	4
MSL839	Current & Emerging Issues in Organizational Management	3	0	0	3	APL360	Engineering Fluid Flows	3	1	0	4
MSL840	Manufacturing Strategy	3	0	0	3	APL380	Biomechanics	3	0	2	4
MSL841	Supply Chain Analytics	3	0	0	3	APL410	Computational Fluid Dynamics	3	0	2	4
MSL842	Supply Chain Modeling	3	0	0	3	APL440	Parallel Processing in Computational Mechanics	3	0	2	4
MSL843	Supply Chain Logistics Management	3	0	0	3	APL705	Finite Element Method	3	0	2	4
MSL844	Systems Reliability, Safety and Maintenance Management	3	0	0	3	APL710	Computer Aided Design	3	0	2	4
MSL845	Total Project Systems Management	3	0	0	3	APL736	Multiscale Modelling of Crystalline Materials	3	0	2	4
MSL846	Total Productivity Management	3	0	0	3	Minor Area in Materials Engineering (Department of Applied Mechanics)					
MSL847	Advanced Methods for Management Research	3	0	0	3	Minor Area Electives					
MSL848	Applied Operations Research	3	0	0	3	APD310	Mini Project	0	0	6	3
MSL849	Current & Emerging Issues in Manufacturing Management	3	0	0	3	APL102	Introducing to Materials Science	3	0	2	4
MSL850	Management of Information Technology	3	0	0	3	APL736	Multiscale Modelling of Crystalline Materials	3	0	2	4
MSL851	Strategic Alliance	1.5	0	0	1.5	APL750	Modern Engineering Materials	3	0	0	3
MSL852	Network System: Applications and Management	3	0	0	3	APL753	Properties and Selection of Engineering Materials	3	0	0	3
MSL853	Software Project Management	3	0	0	3	APL756	Microstructural Characterization of Materials	3	0	2	4
MSL854	Big Data Analytics & Data Science	1.5	0	0	1.5	APL759	Phase Transformations	3	0	0	3
MSL855	Electronic Commerce	3	0	0	3	APL763	Micro & Nanoscale Mechanical Behaviour of Materials	3	0	2	4
MSL856	Business Intelligence	3	0	0	3						
MSL858	Business Process Management with IT	1.5	0	0	1.5						

APL764	Mechanical Behaviour of Biomaterials	3	0	0	3
APL765	Fracture Mechanics	3	0	0	3
APL767	Engineering Failure Analysis and Prevention	3	0	0	3

Minor Area Non Departmental Electives in Material Science

Minor Area Electives

MCL336	Advances in Welding	3	0	2	4
MCL769	Metal Forming Analysis	3	0	2	4
MCL780	Casting Technology	3	0	2	4
MCL787	Welding Science and Technology	3	0	2	4
MCL791	Processing and Mechanics of Composites	3	0	2	4
PTL702	Polymer Science and Technology	3	0	0	3

Minor Area in Computer Science (Department of Computer Science and Engineering)

Minor Area Core

COL106	Data Structures and Algorithms	3	0	4	5
COL202	Discrete Mathematical Structures	3	1	0	4
COL215	Digital Logic and System Design	3	0	4	5
COL216	Computer Architecture	3	0	2	4
COL226	Programming Languages	3	0	4	5
COP290	Design Practices	0	0	6	3
COL331	Operating Systems	3	0	4	5
COL333	Principles of Artificial Intelligence*	3	0	2	4
COL334	Computer Networks	3	0	2	4
COL351	Analysis and Design of Algorithms	3	1	0	4
COL352	Introduction to Automata and Theory of Computation	3	0	0	3
COL362	Introduction to Database Mgmt Systems*	3	0	2	4
COL380	Introduction to Parallel and Distributed Programming	2	0	2	3

Total Credits (any three above courses) 12-15

Minor Area Electives

COD300	Design Project (Non-Graded)	0	0	4	2
COD310	Mini Project	0	0	6	3
COP315	Embedded System Design Project	0	1	6	4
COL341	Machine Learning	3	0	2	4
COL718	Architecture of High Performance Computers	3	0	2	4
COL719	Synthesis of Digital Systems	3	0	2	4
COL722	Introduction to Compressed Sensing	3	0	0	3
COL724	Advanced Computer Networks	3	0	2	4
COL726	Numerical Algorithms	3	0	2	4
COL728	Compiler Design	3	0	3	4.5
COL729	Compiler Optimization	3	0	3	4.5
COL730	Parallel Programming	3	0	2	4
COL732	Virtualization and Cloud Computing	3	0	2	4
COL733	Cloud Computing Technology Fundamentals	3	0	2	4
COL740	Software Engineering	3	0	2	4
COL750	Foundations of Automatic Verification	3	0	2	4
COL751	Algorithmic Graph Theory	3	0	0	3
COL752	Geometric Algorithms	3	0	0	3
COL753	Complexity Theory	3	0	0	3
COL754	Approximation Algorithms	3	0	0	3
COL756	Mathematical Programming	3	0	0	3
COL757	Model Centric Algorithm Design	3	0	2	4
COL758	Advanced Algorithms	3	0	2	4
COL759	Cryptography & Computer Security	3	0	0	3
COL760	Advanced Data Management	3	0	2	4
COL762	Database Implementation	3	0	2	4
COL765	Introduction to Logic and Functional Programming	3	0	2	4
COL768	Wireless Networks	3	0	2	4
COL770	Advanced Artificial Intelligence	3	0	2	4
COL772	Natural Language Processing	3	0	2	4
COL774	Machine Learning	3	0	2	4
COL776	Learning Probabilistic Graphical Models	3	0	2	4
COL780	Computer Vision	3	0	2	4
COL781	Computer Graphics	3	0	3	4.5
COL783	Digital Image Analysis	3	0	3	4.5
COL786	Advanced Functional Brain Imaging	3	0	2	4
COL788	Advanced Topics in Embedded Computing	3	0	0	3
COL812	System Level Design and Modelling	3	0	0	3
COL818	Principles of Multiprocessor Systems	3	0	2	4

COL819	Advanced Distributed Systems	3	0	2	4
COL821	Reconfigurable Computing	3	0	0	3
COL829	Advanced Computer Graphics	3	0	2	4
COL830	Distributed Computing	3	0	0	3
COL831	Semantics of Programming Languages	3	0	0	3
COL832	Proofs and Types	3	0	0	3
COL851	Special Topics in Operating Systems	3	0	0	3
COL852	Special Topics in Compilers	3	0	0	3
COL860	Special Topics in Parallel Computation	3	0	0	3
COL861	Special Topics in Hardware Systems	3	0	0	3
COL862	Special Topics in Software Systems	3	0	0	3
COL863	Special Topics in Theoretical Computer Science	3	0	0	3
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL865	Special Topics in Computer Applications	3	0	0	3
COL866	Special Topics in Algorithms	3	0	0	3
COL867	Special Topics in High Speed Networks	3	0	0	3
COL868	Special Topics in Database Systems	3	0	0	3
COL869	Special Topics in Concurrency	3	0	0	3
COL870	Special Topics in Machine Learning	3	0	0	3
COL871	Special Topics in Programming Languages and Compilers	3	0	0	3
COL872	Special Topics in Cryptography	3	0	0	3
COD891	Minor Project	0	0	6	3
COD892	M.Tech. Project Part-I	0	0	14	7
COD893	M.Tech. Project Part- II	0	0	28	14
COR310	Professional Practices (CS)	1	0	2	2
COS310	Independent Study (CS)	0	3	0	3
COV877	Special Module on Visual Computing	1	0	0	1
COV878	Special Module in Machine Learning	1	0	0	1
COV879	Special Module in Financial Algorithms	2	0	0	2
COV880	Special Module in Parallel Computation	1	0	0	1
COV881	Special Module in Hardware Systems	1	0	0	1
COV882	Special Module in Software Systems	1	0	0	1
COV883	Special Module in Theoretical Computer Science	1	0	0	1
COV884	Special Module in Artificial Intelligence	1	0	0	1
COV885	Special Module in Computer Applications	1	0	0	1
COV886	Special Module in Algorithms	1	0	0	1
COV887	Special Module in High Speed Networks	1	0	0	1
COV888	Special Module in Database Systems	1	0	0	1
COV889	Special Module in Concurrency	1	0	0	1

Minor Area in Cogeneration and Energy Efficiency (Centre for Energy Studies)

Minor Area Core

ESL748	Economics of Energy Conservation	3	0	0	3
ESL784	Cogeneration and Energy Efficiency	3	0	0	3
ESL785	Energy Analysis	3	0	0	3
Total Credits					9

Minor Area Electives

ESL714	Electrical Power Plant Engineering	3	0	0	3
ESL718	Power Generation, Transmission and Distribution	3	0	0	3
ESL722	Integrated Energy Systems	3	0	0	3
ESL726	Waste Heat Recovery	3	0	0	3
ESL776	Industrial Energy and Environmental Analysis	3	0	0	3
ESL875	Alternative Fuels for Transportation	3	0	0	3
ESL786	Exergy Analysis	3	0	0	3

Minor Area in Renewable Energy (Centre for Energy Studies)

Minor Area Electives

ESP713	Energy Laboratories	0	0	6	3
ESL731	Biomass - A Renewable Resource	3	0	0	3
ESL732	Bioconversion and Processing of Waste	3	0	0	3
ESL742	Economics and Financing of Renewable Energy Systems	3	0	0	3
ESL755	Solar Photovoltaic Devices and Systems	3	0	0	3
ESL768	Wind Energy and Hydro Power Systems	3	0	0	3
ESL770	Solar Energy Utilization	3	0	0	3

ESL840	Solar Architecture	3	0	0	3
ESL875	Alternative Fuels for Transportation	3	0	0	3
ESL880	Solar Thermal Power Generation	3	0	0	3

Minor Area in Technologies for Sustainable Rural Development (Centre for Rural Development and Technology)

Minor Area Core (Any three of the following courses)

RDL700	Biomass Production	3	0	0	3
RDL705	Rural Resources and Livelihoods	3	0	0	3
RDL722	Rural Energy Systems	3	0	0	3
RDL724	Technologies for Water and Waste	3	0	0	3
RDL730	Technology Alternatives for Rural Development	3	0	0	3
RDL760	Food Quality and Safety	3	0	0	3

Total Credits 9

Minor Area Electives

RDL701	Rural Industrialization Policies Programmes and Cases	3	0	0	3
RDL726	Herbal, Medicinal and Aromatic Plants	3	0	0	3
RDL740	Technology for Utilization of Wastelands and Weeds	3	0	0	3
RDL801	Successful Forms of Grassroot Organizations	3	0	0	3
RDL807	Women, Technology and Development	3	0	0	3
RDD750	Minor Project	0	0	6	3

Minor Area / Departmental Specialization in Biopharmaceuticals and Fine Chemicals (Department of Chemical Engineering)

Minor Area / Specialization Electives

CLD415	Major Project in Biopharmaceuticals and Fine Chemicals	0	0	10	5
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Total Credits 5

Minor Area / Specialization Core

CLL296	Nano-engineering of Soft Materials	3	0	0	3
CLL730	Structure, Transport and Reactions in BioNano Systems	3	0	0	3
CLL742	Experimental Characterization of BioMacromolecules	3	0	0	3
CLL767	Structures and Properties of Polymers	3	0	0	3
CLL775	Polymerization Process Modeling	3	0	0	3
CLL778	Interfacial Behaviour and Transport of Biomolecules	3	0	0	3
CLL779	Molecular Biotechnology and in-vitro Diagnostics	3	0	0	3
CLL780	Bioprocessing and Bioseparations	3	0	0	3
CLL781	Process Operations Scheduling	3	0	0	3
CLL786	Fine Chemicals Technology	3	0	0	3
CLL791	Chemical Product and Process Integration	3	0	0	3
CLL792	Chemical Product Development and Commercialization	3	0	0	3
CLL793	Membrane Science and Engineering	3	0	0	3
SBL705	Biology of Proteins	3	0	0	3

Minor Area / Departmental Specialization in Complex Fluids and Materials (Department of Chemical Engineering)

Minor Area / Specialization Core

CLD413	Major Project in Complex Fluids	0	0	10	5
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Total Credits 5

Minor Area / Specialization Electives

CLL296	Nano-engineering of Soft Materials	3	0	0	3
CLL766	Interfacial Engineering	3	0	0	3
CLL767	Structures and Properties of Polymers	3	0	0	3
CLL771	Introduction to Complex Fluids	3	0	0	3
CLL772	Transport Phenomena in Complex Fluids	3	0	0	3
CLL773	Thermodynamics of Complex Fluids	3	0	0	3

CLL774	Simulation Techniques for Complex Fluids	3	0	0	3
CLL775	Polymerization Process Modeling	3	0	0	3
CLL776	Granular Materials	3	0	0	3
CLL777	Complex Fluids Technology	3	0	0	3

Minor Area / Departmental Specialization in Energy and Environment (Department of Chemical Engineering)

Minor Area / Specialization Core

CLD412	Major Project in Energy and Environment	0	0	10	5
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Total Credits 5

Minor Area / Specialization Electives

CLL705	Petroleum Reservoir Engineering	3	0	0	3
CLL706	Petroleum Production Engineering	3	0	0	3
CLL720	Principles of Electrochemical Engineering	3	0	0	3
CLL721	Electrochemical Methods	3	0	0	3
CLL722	Electrochemical Conversion and Storage Devices	3	0	0	3
CLL723	Hydrogen Energy and Fuel Cell Technology	3	0	0	3
CLL724	Environmental Engineering and Waste Management	3	0	0	3
CLL725	Air Pollution Control Engineering	3	0	0	3
CLL726	Molecular Modeling of Catalytic Reactions	3	0	0	3
CLL727	Heterogeneous Catalysis and Catalytic Reactors	3	0	0	3
CLL728	Biomass Conversion and Utilization	3	0	0	3
CLL733	Industrial Multiphase Reactors	3	0	0	3
CLL734	Process Intensification and Novel Reactors	3	0	0	3
CLL735	Design of Multicomponent Separation Processes	3	0	0	3
CLL736	Experimental Characterization of Multiphase Reactors	3	0	0	3
CLL743	Petrochemicals Technology	3	0	0	3
CLL768	Fundamentals of Computational Fluid Dynamics	2	0	2	3
CLL769	Applications of Computational Fluid Dynamics	2	0	2	3
CLL793	Membrane Science and Engineering	3	0	0	3
CLL794	Petroleum Refinery Engineering	3	0	0	3

Minor Area / Departmental Specialization in Process Engineering, Modelling and Optimization (Department of Chemical Engineering)

Minor Area / Specialization Core

CLD414	Major Project in Process Engineering, Modeling and Optimization	0	0	10	5
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Total Credits 5

Minor Area / Specialization Electives

CLL390	Process Utilities and Pipeline Design	3	0	0	3
CLL475	Safety and Hazards in Process Industries	3	0	0	3
CLL477	Materials of Construction	3	0	0	3
CLL707	Population Balance Modeling	3	0	0	3
CLL733	Industrial Multiphase Reactors	3	0	0	3
CLL734	Process Intensification and Novel Reactors	3	0	0	3
CLL735	Design of Multicomponent Separation Processes	3	0	0	3
CLL736	Experimental Characterization of Multiphase Reactors	3	0	0	3
CLL761	Chemical Engineering Mathematics	3	0	0	3
CLL762	Advanced Computational Techniques in Chemical Engineering	2	0	2	3
CLL768	Fundamentals of Computational Fluid Dynamics	2	0	2	3
CLL769	Applications of Computational Fluid Dynamics	2	0	2	3
CLL781	Process Operations Scheduling	3	0	0	3
CLL782	Process Optimization	3	0	0	3
CLL783	Advanced Process Control	3	0	0	3
CLL784	Process Modeling and Simulation	3	0	0	3
CLL785	Evolutionary Optimization	3	0	0	3
CLL791	Chemical Product and Process Integration	3	0	0	3
CLL792	Chemical Product Development and Commercialization	3	0	0	3
CLL793	Membrane Science and Engineering	3	0	0	3

Minor Area / Departmental Specialization in Nanoscience and Technology (Department of Physics)

Minor Area / Specialization Core

PYL112	Quantum Mechanics	3	1	0	4
PYL201	Fundamentals of Dielectrics & Semiconductors	3	1	0	4

Total Credits 8

Minor Area / Specialization Electives

PYL321	Low Dimensional Physics	3	0	0	3
PYL322	Nanoscale Fabrication	3	0	0	3
PYL323	Nanoscale Microscopy	2	0	0	2
PYL324	Spectroscopy of Nanomaterials	2	0	0	2
PYL421	Functional Nanostructures	3	0	0	3
PYL422	Spintronics	3	0	0	3
PYL423	Nanoscale Energy Materials & Devices	3	0	0	3
PYV428	Selected Topics in Nanotechnology	2	0	0	2
PYV429	Special Topics in Nanotechnology	1	0	0	1

Minor Area / Departmental Specialization in Photonics Technology (Department of Physics)

Minor Area / Specialization Core

PYL112	Quantum Mechanics	3	1	0	4
PYL115	Applied Optics	3	1	0	4

Total Credits 8

Minor Area / Specialization Electives

PYL311	Lasers	3	0	0	3
PYL312	Semiconductor Optoelectronics	3	0	0	3
PYL313	Fourier Optics and Holography	3	0	0	3
PYL411	Quantum Electronics	3	0	0	3
PYL412	Ultrafast Laser Systems and Applications	3	0	0	3
PYL413	Fiber and Integrated Optics	3	0	0	3
PYD414	Project III	0	0	8	4
PYL414	Engineering Optics	3	0	0	3
PYV418	Selected Topics in Photonics	2	0	0	2
PYV419	Special Topics in Photonics	1	0	0	1

Interdisciplinary Specialization in Biodesign

Specialization Core

BML741	Medical Device Design	2	0	4	4
BMD742	Minor Biodesign Project	0	0	8	4

Total Credits 8

Specialization Electives

APL380	Biomechanics	3	0	2	4
BML700	Introduction to Basic Medical Sciences for Engineers	3	0	0	3
BML710	Industrial Biomaterial Technology	3	0	0	3
BML720	Medical Imaging	3	0	0	3
BML735	Biomedical Signal and Image processing	2	0	2	3
BML736	Mathematics for Biomedical Engineering	1	0	0	1
BML743	Special Topics in Biodesign	3	0	0	3
BML750	Point of Care Medical Diagnostic Devices	3	0	0	3
BML770	Fundamentals of Biomechanics	3	0	0	3
BML771	Medical Device Design for Orthopaedic Applications	3	0	0	3
BML772	Biofabrication	3	0	0	3
BML810	Tissue Engineering	3	0	0	3
BML820	Biomaterials	3	0	0	3
BML830	Biosensor Technology	3	0	2	4
CLL779	Molecular Biotechnology and in-vitro Diagnostics	3	0	0	3
MCL442	ThermoFluid Analysis of Biosystems	3	0	0	3
TXL773	Medical Textiles	3	0	0	3

Interdisciplinary Specialization in Robotics

Specialization Core

COP315*	Embedded System Design Project	0	1	6	4
ELL225#	Control Engineering-I	3	1	0	4
ELL365*	Embedded Systems	3	0	0	3
MCL212#	Control Theory and Applications	3	0	2	4

MCL111+	Kinematics and Dynamics of Machines	3	0	2	4
JRL310	Robotics Technology	3	0	0	3
JRD301	Mini Project in Robotics	0	0	14	7

Total Credits 13/14

* Students of ME1/ME2 to take only one of these courses as core.

Students of CS1/CS5 to take only one of these courses as core.

+Core for EE1/EE3 students only.

Specialization Electives

COL106	Data Structures and Algorithms	3	0	4	5
COL333	Principles of Artificial Intelligence*	3	0	2	4
COL740	Software Engineering	3	0	2	4
COL780	Computer Vision	3	0	2	4
COL864	Special Topics in Artificial Intelligence	3	0	0	3
MCL749	Mechatronics Product Design	3	0	2	4

Departmental Specialization in Applications and Information Technology (Department of Computer Science and Engineering)

Specialization Core

COD494	B.Tech. Project Part-II	0	0	16	8
COL703	Logic for Computer Science	3	0	2	4

Total Credits 12

Specialization Electives

COL333	Principles of Artificial Intelligence*	3	0	2	4
COL362	Introduction to Database Mgmt. Systems*	3	0	2	4
COL722	Introduction to Compressed Sensing	3	0	0	3
COL757	Model Centric Algorithm Design	3	0	2	4
COL760	Advanced Data Management	3	0	2	4
COL762	Database Implementation	3	0	2	4
COL765	Introduction to Logic and Functional Programming	3	0	2	4
COL770	Advanced Artificial Intelligence	3	0	2	4
COL786	Advanced Functional Brain Imaging	3	0	2	4
COL865	Special Topics in Computer Applications	3	0	0	3
COL869	Special Topics in Concurrency	3	0	0	3
COV885	Special Module in Computer Applications	1	0	0	1
COV888	Special Module in Database Systems	1	0	0	1
COV889	Special Module in Concurrency	1	0	0	1
SIL769	Internet Traffic -Measurement, Modeling & Analysis	3	0	2	4
SIL801	Special Topics in Multimedia System	3	0	0	3
SIL802	Special Topics in Web Based Computing	3	0	0	3
SIV813	Applications of Computer in Medicines	1	0	0	1
SIV861	Information and Comm Technologies for Development	1	0	0	1
SIV864	Special Module on Media Processing & Communication	1	0	0	1
SIV871	Special Module in Computational Neuroscience	1	0	0	1
SIV889	Special Module in Human Computer Interaction	1	0	0	1
SIV895	Special Module on Intelligent Information Processing	1	0	0	1

Departmental Specialization in Architecture and Embedded Systems (Department of Computer Science and Engineering)

Specialization Core

COD494	B.Tech. Project Part-II	0	0	16	8
COL703	Logic for Computer Science	3	0	2	4

Total Credits 12

Specialization Electives

COP315	Embedded System Design Project	0	1	6	4
COL718	Architecture of High Performance Computers	3	0	2	4
COL719	Synthesis of Digital Systems	3	0	2	4
COL788	Advanced Topics in Embedded Computing	3	0	0	3
COL812	System Level Design and Modelling	3	0	0	3
COL818	Principles of Multiprocessor Systems	3	0	2	4
COL821	Reconfigurable Computing	3	0	0	3
COL861	Special Topics in Hardware Systems	3	0	0	3
COV881	Special Module in Hardware Systems	1	0	0	1

Departmental Specialization in Data Analytics and Artificial Intelligence (Department of Computer Science and Engineering)

Specialization Core

COD494	B.Tech. Project Part 2	0	0	168
COL703	Logic for Computer Science	3	0	2 4
Total Credits				12

Specialization Electives

COL333	Principles of Artificial Intelligence*	3	0	2 4
COL341	Machine Learning	3	0	2 4
COL362	Introduction to Database Mgmt. Systems*	3	0	2 4
COL760	Advanced Data Management	3	0	2 4
COL762	Database Implementation	3	0	2 4
COL765	Introduction to Logic and Functional Programming	3	0	2 4
COL770	Advanced Artificial Intelligence	3	0	2 4
COL772	Natural Language Processing	3	0	2 4
COL774	Machine Learning	3	0	2 4
COL776	Learning Probabilistic Graphical Models	3	0	2 4
COL786	Advanced Functional Brain Imaging	3	0	2 4
COL864	Special Topics in Artificial Intelligence	3	0	0 3
COL868	Special Topics in Database Systems	3	0	0 3
COL869	Special Topics in Concurrency	3	0	0 3
COL870	Special Topics in Machine Learning	3	0	0 3
COV878	Special Module in Machine Learning	1	0	0 1
COV884	Special Module in Artificial Intelligence	1	0	0 1
COV888	Special Module in Database Systems	1	0	0 1
COV889	Special Module in Concurrency	1	0	0 1

Departmental Specialization in Graphics and Vision (Department of Computer Science and Engineering)

Specialization Core

COD494	B.Tech. Project Part 2	0	0	168
COL703	Logic for Computer Science	3	0	2 4
Total Credits				12

Specialization Electives

COL780	Computer Vision	3	0	2 4
COL781	Computer Graphics	3	0	3 4.5
COL783	Digital Image Analysis	3	0	3 4.5
COL829	Advanced Computer Graphics	3	0	2 4
COV877	Special Module on Visual Computing	1	0	0 1
SIL801	Special Topics in Multimedia System	3	0	0 3

Departmental Specialization in Software Systems (Department of Computer Science and Engineering)

Specialization Core

COD494	B.Tech. Project Part 2	0	0	168
COL703	Logic for Computer Science	3	0	2 4
Total Credits				12

Specialization Electives

COL724	Advanced Computer Networks	3	0	2 4
COL728	Compiler Design	3	0	3 4.5
COL729	Compiler Optimization	3	0	3 4.5
COL730	Parallel Programming	3	0	2 4
COL732	Virtualization and Cloud Computing	3	0	2 4
COL733	Cloud Computing Technology Fundamentals	3	0	2 4
COL740	Software Engineering	3	0	2 4
COL768	Wireless Networks	3	0	2 4
COL819	Advanced Distributed Systems	3	0	2 4
COL851	Special Topics in Operating Systems	3	0	0 3
COL852	Special Topics in Compilers	3	0	0 3
COL860	Special Topics in Parallel Computation	3	0	0 3
COL862	Special Topics in Software Systems	3	0	0 3
COL867	Special Topics in High Speed Networks	3	0	0 3
COL871	Special Topics in Programming Languages and Compilers	3	0	0 3
COV880	Special Module in Parallel Computation	1	0	0 1
COV882	Special Module in Software Systems	1	0	0 1

COV887	Special Module in High Speed Networks	1	0	0 1
SIL765	Networks & System Security	3	0	2 4
SIL769	Internet Traffic -Measurement, Modeling & Analysis	3	0	2 4

Departmental Specialization in Theoretical Computer Science (Department of Computer Science and Engineering)

Specialization Core

COD494	B.Tech. Project Part 2	0	0	168
COL702	Advanced Data Structures	3	0	2 4
COL703	Logic for Computer Science	3	0	2 4
Total Credits				16

Specialization Electives

COL726	Numerical Algorithms	3	0	2 4
COL730	Parallel Programming	3	0	2 4
COL750	Foundations of Automatic Verification	3	0	2 4
COL751	Algorithmic Graph Theory	3	0	0 3
COL752	Geometric Algorithms	3	0	0 3
COL753	Complexity Theory	3	0	0 3
COL754	Approximation Algorithms	3	0	0 3
COL756	Mathematical Programming	3	0	0 3
COL757	Model Centric Algorithm Design	3	0	2 4
COL758	Advanced Algorithms	3	0	2 4
COL759	Cryptography & Computer Security	3	0	0 3
COL830	Distributed Computing	3	0	0 3
COL831	Semantics of Programming Languages	3	0	0 3
COL832	Proofs and Types	3	0	0 3
COL860	Special Topics in Parallel Computation	3	0	0 3
COL863	Special Topics in Theoretical Computer Science	3	0	0 3
COL866	Special Topics in Algorithms	3	0	0 3
COL872	Special Topics in Cryptography	3	0	0 3
COV879	Special Module in Financial Algorithms	2	0	0 2
COV883	Special Module in Theoretical Computer Science	1	0	0 1
COV886	Special Module in Algorithms	1	0	0 1

Departmental Specialization in Environmental Engineering (Department of Civil Engineering)

Specialization Core

CVD412	B.Tech. Project Part-II	0	0	126
CVL313	Air and Noise Pollution	3	0	0 3
CVL721	Solid Waste Engineering	3	0	0 3
CVL724	Environmental Systems Analysis	3	0	2 4
Total Credits				16

Specialization Electives (8 Credits)

CVL311	Industrial Waste Management	3	0	0 3
CVL312	Environmental Assessment Methodologies	3	0	0 3
CVL727	Environmental Risk Assessment	3	0	0 3
CVL820	Environmental Impact Assessment	3	0	0 3
CVL822	Emerging Technologies for Environmental Management	3	0	0 3
CVL823	Thermal Techniques for Waste Mgmt.	3	0	0 3
CVL824	Life Cycle Analysis & Design for Environment	3	0	0 3

Departmental Specialization in Geotechnical Engineering (Department of Civil Engineering)

Specialization Core

CVD412	B.Tech. Project Part-II	0	0	126
CVL421	Ground Engineering	3	0	0 3
CVL422	Rock Engineering	3	0	0 3
CVL423	Soil Dynamics	3	0	0 3
CVP424	Environmental Geotechniques and Geosynthetics	3	0	0 3
Total Credits				18

Specialization Electives (6 Credits)

CVL431	Design of Foundations & Retaining Structures	3	0	0 3
CVL432	Stability of Slopes	2	0	0 2
CVL433	FEM in Geotechnical Engineering	3	0	0 3

CVL434	Geotechnical Design Studio	0	0	4	2
CVL435	Underground Structures	2	0	0	2

Departmental Specialization in Structural Engineering (Department of Civil Engineering)

Specialization Core

CVD412	B.Tech. Project Part-II	0	0	12	6
CVL441	Structural Design	3	0	0	3
CVL442	Structural Analysis-III	3	0	0	3
CVL443	Prestressed Concrete & Industrial Structures	3	0	0	3
CVL758	Solid Mechanics in Structural Engineering	3	0	0	3
Total Credits					18

Specialization Electives (6 Credits)

CVL763	Analytical and Numerical Methods for Struct. Engineering	2	1	0	3
CVL765	Concrete Mechanics	3	0	0	3
CVL766	Design of Bridge Structures	3	0	0	3
CVL768	Design of Masonry Structures	3	0	0	3
CVL769	Design of Tall Buildings	3	0	0	3
CVL770	Prestressed and Composite Structures	3	0	0	3
CVL771	Advanced Concrete Technology	3	0	0	3
CVL857	Structural Safety and Reliability	3	0	0	3
CVL858	Theory of Plates and Shells	3	0	0	3
CVL859	Theory of Structural Stability	3	0	0	3
CVL862	Design of Offshore Structures	3	0	0	3
CVL866	Wind Resistant Design of Structures	3	0	0	3

Departmental Specialization in Transportation Engineering (Department of Civil Engineering)

Specialization Core

CVD412	B.Tech. Project Part-II	0	0	12	6
CVL740	Pavement Materials and Design of Pavements	2	0	2	3
CVL741	Urban and Regional Transportation Planning	2	0	2	3
CVL742	Traffic Engineering	3	0	2	4
Total Credits					16

Specialization Electives (8 Credits)

CVL361	Introduction to Railway Engineering	3	0	0	3
CVL461	Logistics and Freight Transport	3	0	0	3
CVL462	Introduction to Intelligent Transportation Systems	3	0	0	3
CVL743	Airport Planning and Design	3	0	0	3
CVL744	Transportation Infrastructure Design	3	0	0	3
CVL746	Public Transportation Systems	3	0	0	3
CVL841	Advanced Transportation Modelling	2	0	2	3
CVL842	Geometric Design of Roads	2	0	2	3
CVL847	Transportation Economics	3	0	0	3

Departmental Specialization in Water Resources Engineering (Department of Civil Engineering)

Specialization Core

CVL382	Groundwater	2	0	0	2
CVL481	Water Resources Management	3	0	0	3
CVL482	Water Power Engineering	2	0	2	3
CVL483	Groundwater & Surface-water Pollution	2	0	0	2
CVD412	B.Tech. Project Part-II	0	0	12	6
Total Credits					16

Specialization Electives (8 Credits)

CVL284	Fundamentals of Geographic Information Systems	2	0	2	3
CVL383	Water Resources Systems	2	0	0	2
CVL384	Urban Hydrology	2	0	0	2
CVL385	Frequency Analysis in Hydrology	2	0	0	2
CVL386	Fundamentals of Remote Sensing	2	0	2	3
CVL484	Computational Aspects in Water Resources	1	0	4	3
CVL485	River Mechanics	2	0	2	3
CVL486	Geo-informatics	2	0	2	3
CVL837	Mechanics of Sediment Transport	3	0	0	3

Departmental Specialization in Automotive Design (Department of Mechanical Engineering)

Specialization Core

MCD412	B.Tech. Project-II	0	0	14	7
MCL321	Automotive Systems	3	0	2	4

Total Credits

11

Specialization Electives

MCL322	Power Train Design	3	0	0	3
MCL421	Automotive Structural Design	2	0	2	3
MCL422	Design of Brake Systems	2	0	2	3
MCL721	Automotive Prime Movers	3	0	0	3
MCL722	Mechanical Design of Prime Mover Elements	3	0	0	3
MCL723	Vehicle Dynamics	3	0	0	3
MCL724	Biomechanics of Trauma in Automotive Design	3	0	0	3
MCL725	Design Electronic Assist Systems in Automobiles	3	0	0	3
MCL726	Design of Steering Systems	3	0	0	3

Departmental Specialization in Technical and Innovative Textiles (Department of Textile Technology)

Specialization Electives

TXD402	Major Project Part-II	0	0	16	8
TXL710	High Performance and Specialty Fibres	3	0	0	3
TXL719	Functional and Smart Textiles	3	0	0	3
TXL734	Nonwoven Science and Engineering	3	0	0	3
TXL740	Science & App. of Nanotechnology in Textiles	3	0	0	3
TXL752	Design of Functional Clothing	3	0	0	3
TXL773	Medical Textiles	3	0	0	3
TXL775	Technical Textiles	3	0	0	3
TXL776	Design & Manuf. of Text. Reinforced Composites	3	0	0	3

Departmental Specialization in Textile Business Management (Department of Textile Technology)

Specialization Electives

MCL756	Supply Chain Management	3	0	0	3
MCL760	Project Management	3	0	0	3
TXD402	Major Project Part-II	0	0	16	8
TXL381	Costing and its Application in Textiles	3	1	0	4
TXL781	Costing, Project Formulation and Appraisal	3	0	0	3
TXL782	Production and Operations Management in Textile Industry	3	0	0	3
TXL783	Design of Experiments and Statistical Techniques	3	0	0	3
TXV702	Management of Textile Business	1	0	0	1

Departmental Specialization in Appliance Engineering (Department of Electrical Engineering)

Specialization Electives

ELD451	BTP Part-II	0	0	16	8
ELL319	Digital Signal Processing	3	0	2	4
ELL365	Embedded Systems	3	0	0	3
ELL450	Special Topics in AE-I	3	0	0	3
ELL754	Permanent Magnet Machines	3	0	0	3
ELL756	Special Electrical Machines	3	0	0	3
ELL762	Intelligent Motor Controllers	3	0	0	3
ELL766	Appliance System	3	0	0	3
ELL767	Mechatronics	3	0	0	3
ELV750	Special Modules in AE-I	1	0	0	1

Departmental Specialization in Cognitive and Intelligent Systems (Department of Electrical Engineering)

Specialization Electives

ELD451	BTP Part-II	0	0	16	8
ELL409	Machine Intelligence and Learning	3	0	2	4
ELL457	Special Topics in C&IS - I	3	0	0	3
ELL704	Advanced Robotics	3	0	0	3
ELL707	Systems Biology	3	0	0	3
ELL715	Digital Image Processing	3	0	2	4
ELL741	Neuromorphic Engineering	3	0	0	3
ELL762	Intelligent Motor Controllers	3	0	0	3
ELL779	Forecasting Techniques for Power Systems	3	0	0	3

ELL784	Introduction to Machine Learning	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3
ELL788	Computational Cognition and Perception	3	0	0	3
ELL789	Intelligent Systems	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL793	Computer Vision	3	0	0	3
ELL794	Human-Computer Interface	3	0	0	3
ELL795	Swarm Intelligence	3	0	0	3
ELL796	Signals and Systems in Biology	3	0	0	3
ELL798	Agent Technology	3	0	0	3
ELL799	Natural Computing	3	0	0	3
ELV780	Special Modules in C&IS – I	1	0	0	1

Departmental Specialization in Communication Systems and Networking (Department of Electrical Engineering)

Specialization Electives

ELD458	BTP Part-II	0	0	16	8
ELL411	Digital Communications	3	0	2	4
ELL458	Special Topics in CS&N – I	3	0	0	3
ELL713	Microwave theory and techniques	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL717	Optical Communication Systems	3	0	0	3
ELL723	Broadband Communication Systems	3	0	0	3
ELL725	Wireless Communications	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELV720	Special Modules in CS&N – I	1	0	0	1

Departmental Specialization in Electric Transportation (Department of Electrical Engineering)

Specialization Electives

ELD454	BTP Part-II	0	0	16	8
ELL334	DSP based Control of drives	3	0	2	4
ELL450	Special Topics in AE – I	3	0	0	3
ELL454	Special Topics in ET – I	3	0	0	3
ELL750	Modeling of electrical machines	3	0	0	3
ELL754	Permanent Magnet Machines	3	0	0	3
ELL755	Variable Reluctance Machines	3	0	0	3
ELL764	Electric vehicles	3	0	0	3
ELV753	Special Modules in ET – I	1	0	0	1

Departmental Specialization in Energy-Efficient Technologies (Department of Electrical Engineering)

Specialization Electives

ELD453	BTP Part-II	0	0	16	8
ELL408	Low Power Circuit Design	3	0	0	3
ELL453	Special Topics in EET – I	3	0	0	3
ELL721	Introduction to Telecommunication Systems	3	0	0	3
ELL743	Photovoltaics	3	0	0	3
ELL757	Energy Efficient Motors	3	0	0	3
ELL763	Advanced Electrical Drives	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL797	Energy Efficient Computing	3	0	0	3
ELV752	Special Modules in EET – I	1	0	0	1

Departmental Specialization in Information Processing (Department of Electrical Engineering)

Specialization Electives

ELD459	BTP Part-II	0	0	16	8
ELL459	Special Topics in IP – I	3	0	0	3
ELL460	Special Topics in IP – II	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL715	Digital Image processing	3	0	2	4
ELL718	Statistical signal processing	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3
ELL793	Computer Vision	3	0	0	3
ELL794	Human-Computer Interface	3	0	0	3
ELV781	Special Modules in IP – I	1	0	0	1
CRL707	Human and Machine Speech Communications	3	0	0	3

Departmental Specialization in Nano-electronic and Photonic Systems (Department of Electrical Engineering)

Specialization Electives

ELD456	BTP Part-II	0	0	16	8
ELL456	Special Topics in NE&PS – I	3	0	0	3
ELL730	IC Technology	3	0	0	3
ELL732	Micro and Nanoelectronics	3	0	0	3
ELL737	Flexible Electronics	3	0	0	3
ELL738	Micro and Nano photonics	3	0	0	3
ELL739	Advanced semiconductor devices	3	0	0	3
ELL740	Compact Modeling of Semiconductor Devices	3	0	2	4
ELL741	Neuromorphic Engineering	3	0	0	3
ELL742	Introduction to MEMS Design	3	0	0	3
ELL743	Photovoltaics	3	0	0	3
ELL744	Electronic and Photonic Nanomaterials	3	0	0	3
ELL745	Quantum Electronics	3	0	0	3
ELV731	Special Modules in NE&PS – I	1	0	0	1

Departmental Specialization in Smart Grid and Renewable Energy (Department of Electrical Engineering)

Specialization Electives

ELD452	BTP Part-II	0	0	16	8
ELL402	Computer Communications	3	0	0	3
ELL417	Renewable Energy Systems	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL770	Power System Analysis	3	0	0	3
ELL771	Special Topics in SG&RE – I	3	0	0	3
ELL772	Planning and Operation of Smart Grid	3	0	0	3
ELL773	High Voltage DC Transmission	3	0	0	3
ELL774	Flexible AC Transmission Systems	3	0	0	3
ELL775	Power System Dynamics	3	0	0	3
ELL789	Intelligent Systems	3	0	0	3
ELV451	Special Modules in SG&RE – I	1	0	0	1

Departmental Specialization in Systems and Control (Department of Electrical Engineering)

Specialization Electives

ELD450	BTP Part-II	0	0	16	8
ELL436	Digital Control	3	0	0	3
ELL700	Linear Systems Theory	3	0	0	3
ELL702	Nonlinear Systems	3	0	0	3
ELL703	Optimal Control Theory	3	0	0	3
ELL704	Advanced Robotics	3	0	0	3
ELL705	Stochastic Filtering and Identification	3	0	0	3
ELL707	Systems Biology	3	0	0	3
ELL708	Selected Topics in Systems and Control	3	0	0	3
ELL762	Intelligent Motor Controllers	3	0	0	3
ELV700	Special Modules in Systems and Control	1	0	0	1

Departmental Specialization in VLSI and Embedded Systems (Department of Electrical Engineering)

Specialization Electives

ELD455	BTP Part-II	0	0	16	8
ELL365	Embedded Systems	3	0	0	3
ELL455	Special Topics in V&ES – I	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL730	IC Technology	3	0	0	3
ELL731	Mixed signal circuit design	3	0	0	3
ELL733	Digital ASIC Design	3	0	2	4
ELL734	MOS VLSI Design	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELL736	Solid State Imaging Sensors	3	0	0	3
ELL740	Compact Modeling of Semiconductor Devices	3	0	2	4
ELL741	Neuromorphic Engineering	3	0	0	3
ELL747	Active and Passive Filter Design	3	0	0	3
ELL748	System-on-Chip Design and Test	3	0	0	3
ELL749	Semiconductor Memory Design	3	0	0	3
ELV730	Special Modules in V&ES – I	1	0	0	1