



B. Tech. (IT & Mathematical Innovations)

COURSE STRUCTURE

Key: T: Theory, L: Lab, P: Project/Internship

Semester I

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
I.1	Seeing the world through Calculus . First steps through symbolic mathematics	3	3	0	6	75	75	0	150
I.2	Linearity in Nature: Engineering through Linear Algebra . First steps through numerical algorithms	3	3	0	6	75	75	0	150
I.3	Optimizing memory use through Data Structure and Design	4	0	0	4	100	0	0	100
I.4	The Science and Art of Logic and Programming: Algorithms	4	0	0	4	100	0	0	100
I.5	Physics at work I: Deconstructing Machines	3	3	0	6	75	75	0	150
I.6	Business, Entrepreneurship and Innovation Management	4	0	0	4	100	0	0	100
I.7	Environment Science & Ecosystem Management	2	0	0	2	50	0	0	50
Grand Total		23	9	0	32	575	225	0	800



Semester II

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
II.1	Modeling continuous changes through <i>ordinary differential equations and complex analysis</i>	3	3	0	6	75	75	0	150
II.2	Understanding real life situations through <i>Discrete Mathematics</i>	4	0	0	4	100	0	0	100
II.3	Decoding <i>Computation Structure & Logic</i>	4	0	0	4	100	0	0	100
II.4	Reflecting thought processes via <i>Object Oriented Programming</i>	3	3	0	6	75	75	0	150
II.5	Physics at work II: <i>Deconstructing devices</i>	3	3	0	6	75	75	0	150
II.6	Art of <i>Communication & Creative Writing</i>	3	0	0	3	75	0	0	75
II.7	Knowing specialization streams (Electives)								
II.7.1	<i>Business processes and strategic IT alignment</i>	3	0	0	3	75	0	0	75
II.7.2	<i>Electronics at work & circuit simulations</i>	3	0	0	3	75	0	0	75
II.7.3	<i>Exploring Biology - Systems Approach</i>	3	0	0	3	75	0	0	75
Grand Total		23	9	0	32	575	225	0	800

Note:

1. The student may opt for one or more papers in II.7. Only one paper will be included in the transcript as credit paper and the others as non-credit paper.
2. At the end of second semester, the student will opt for only one of the streams and will pursue papers meant for that stream in the subsequent semesters.



Semester III

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
III.1	Modeling change in the world around us: <i>Partial Differential Equations</i>	4	0	0	4	100	0	0	100
III.2	Handling information through <i>Data Modeling & Design</i>	3	3	0	6	75	75	0	150
III.3	Instructing computing devices: <i>Operating System</i>	4	0	0	4	100	0	0	100
III.4	Language and Communication: <i>Computational Linguistics</i>	4	0	0	4	100	0	0	100
III.5	Specialization Stream – 1								
III.5.1	Understanding <i>Economic Behavior</i> : The <i>micro</i> level	4	0	0	4	100	0	0	100
III.5.2	<i>Electronics circuit elements and instruments</i>	4	0	0	4	100	0	0	100
III.5.3	<i>Integrative Biology</i>	4	0	0	4	100	0	0	100
III.6	Specialization Stream – 2								
III.6.1	<i>Principles of Management</i>	4	0	0	4	100	0	0	100
III.6.2	<i>Electronics circuit elements and instruments – Innovation Lab</i>	0	4	0	4	0	100	0	100
III.6.3	<i>Cell: Biochemical and Molecular perspective</i>	4	0	0	4	100	0	0	100
III.7	Summer Internship : projects drawn from the world around us	0	0	6	6	0	0	150	150
Grand Total		23	3	6	32	575*	75*	150	800

Note:

1. The students will attend papers in III.5 & III.6 only from the opted stream
2. * For students opting for Electronics stream, the total marks for theory in this semester will be 475 and total marks for practical will be 175
3. The student will execute the internship III.7 during the preceding summer break.



Semester IV

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
IV.1	Does Nature play dice?: The amazing world of <i>probability and statistics</i>	3	3	0	6	75	75	0	150
IV.2	Understanding Computing <i>Systems Architecture</i>	3	3	0	6	75	75	0	150
IV.3	<i>Software Engineering</i>	3	0	0	3	75	0	0	75
IV.4	<i>Science, Philosophy, Truth: Impact of technology</i>	3	0	0	3	75	0	0	75
IV.5	Specialization Stream – 3								
IV.5.1	Understanding <i>Economic Behaviour</i> : The <i>macro</i> level	4	0	0	4	100	0	0	100
IV.5.2	<i>Digital electronics and logic design</i>	4	0	0	4	100	0	0	100
IV.5.3	<i>Genes to Genomes</i>	4	0	0	4	100	0	0	100
IV.6	Specialization Stream – 4								
IV.6.1	Bringing Companies and clients together: Sales & Marketing management	4	0	0	4	100	0	0	100
IV.6.2	<i>Digital electronics and logic design</i> – Innovation Lab	0	4	0	4	0	100	0	100
IV.6.3	<i>Flow of information in living systems</i>	4	0	0	4	100	0	0	100
IV.7	Semester long innovation project	0	0	6	6	0	0	150	150
Grand Total		20	6	6	32	500*	150*	150	800

Note:

1. The student will attend papers in IV.5 & IV.6 only from the opted stream
2. * For students opting for Electronics stream, the total marks for theory in this semester will be 400 and total marks for practical will be 250
3. The student will finalize the semester long project title, area, and mentor(s) for IV.7 during Semester III. The project work will commence from the beginning of the preceding winter break.



Semester V

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
V.1	Algorithms for Computational Mathematics: <i>Numerical Methods</i>	3	3	0	6	75	75	0	150
V.2	Information exchange in computing devices: <i>Data Communication & Networking</i>	4	0	0	4	100	0	0	100
V.3	Computer and Brain: Knowledge Discovery and <i>Artificial Intelligence</i>	3	0	0	3	75	0	0	75
V.4	<i>History, culture & civilization</i>	3	0	0	3	75	0	0	75
V.5	Specialization Stream – 5								
V.5.1	Maximizing performance: <i>Human Resource management and Organizational Behavior</i>	4	0	0	4	100	0	0	100
V.5.2	<i>Embedded systems studio - I</i>	4	0	0	4	100	0	0	100
V.5.3	<i>Biological Networks</i> : from Micro to Macro niche	4	0	0	4	100	0	0	100
V.6	Specialization Stream – 6								
V.6.1	Efficient manufacturing process: <i>Production and Operations Management</i>	3	3	0	6	75	75	0	150
V.6.2	<i>Signals & Systems Engineering</i>	3	3	0	6	75	75	0	150
V.6.3	<i>Applied Genomics and Proteomics</i> : Methods and techniques	3	3	0	6	75	75	0	150
V.7	Industrial mini project	0	0	6	6	0	0	150	150
Grand Total		20	6	6	32	500	150	150	800

Note:

1. The Student will attend papers in V.5 & V.6 only from the opted stream
2. The student will execute the Industrial mini project V.7 during the preceding summer break



Semester VI

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
VI.1	Linear Construction of Actions: Engineering through <i>Linear Programming and Game Theory</i>	4	0	0	4	100	0	0	100
VI.2	<i>Computer Graphics and Visualization</i>	3	3	0	6	75	75	0	150
VI.3	<i>Advanced Algorithm Design</i>	3	0	0	3	75	0	0	75
VI.4	<i>Art & Design</i>	3	0	0	3	75	0	0	75
VI.5	Specialization Stream – 7								
VI.5.1	Handling money: <i>Finance management</i>	4	0	0	4	100	0	0	100
VI.5.2	<i>Embedded systems studio – II</i>	4	0	0	4	100	0	0	100
VI.5.3	<i>Biodefense and Bioengineering</i>	4	0	0	4	100	0	0	100
VI.6	Specialization Stream – 8								
VI.6.1	<i>e - Business: Organization and Strategy</i>	3	3	0	6	75	75	0	150
VI.6.2	<i>Control systems</i>	3	3	0	6	75	75	0	150
VI.6.3	<i>In silico Biology</i>	3	3	0	6	75	75	0	150
VI.7	Project in Industry, Society and Villages	0	0	6	6	0	0	150	150
Grand Total		20	6	6	32	500	150	150	800

Note:

1. The student will attend papers in VI.5 & VI.6 only from the opted stream
2. Students will finalize the semester long project title, area, and mentor(s) for VI.7 during Semester V. The project work will commence from the beginning of the preceding winter break.



Semester VII

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
VII.1	Fluidity in nature: computational interpretations	4	0	0	4	100	0	0	100
VII.2	Computer Language Design & Engineering	3	0	0	3	75	0	0	75
VII.3	Software Project Management	3	3	0	6	75	75	0	150
VII.4	Visual arts & aesthetics	3	0	0	3	75	0	0	75
VII.5	Specialization Stream – 9								
VII.5.1	Environment Management	4	0	0	4	100	0	0	100
VII.5.2	Engineering at Molecular Scale: Devices and Nanotechnology	4	0	0	4	100	0	0	100
VII.5.3	Modeling and Simulating Brain Functions: Computational Neuroscience	4	0	0	4	100	0	0	100
VII.6	Specialization Stream – 10								
VII.6.1	Business automation strategies. ERP. Case studies and project in industry	3	3	0	6	75	75	0	150
VII.6.2	Circuit Analysis and Synthesis	3	3	0	6	75	75	0	150
VII.6.3	Systems Biology	3	3	0	6	75	75	0	150
VII.7	Industrial mini project, Simulation of real time cases	0	0	6	6	0	0	150	150
Grand Total		20	6	6	32	500	150	150	800

Note:

1. The student will attend papers in VII.5 & VII.6 only from the opted stream
2. Students will execute the Industrial mini project VII.7 during the preceding summer break



Key: T: Theory, L: Lab, P: Project/Internship

Semester VIII

Paper No.	Interactive Learning Modules (Paper Title)	Credits				Marks			
		T	L	P	Total	T	L	P	Total
VIII.1	Industrial Internship/Major Project	0	0	32	32	0	0	800	800
Grand Total		0	0	32	32	0	0	800	800

Note:

1. Students will decide the field of work and the organization for execution of the Industrial Internship/Major Project VIII.1 during Semester VII.