

**Department of Electronics & Communication Engineering
and
Department of Computer Science and Engineering**

Course Structure and Syllabi

For

4 Yrs. B.Tech Programme

Effective from 2020 Batch Onwards



भारतीय सूचना प्रौद्योगिकी संस्थान राँची
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, RANCHI
(An Institution of National importance under act of Parliament)
(Ranchi - 834010), Jharkhand

I. Highlights of Changes in Proposed B.Tech Course Structure

<u>Existing course structure</u>	<u>Proposed course structure</u>
<ul style="list-style-type: none">B.Tech (Hons.) degree is awarded to every admitted student.	<ul style="list-style-type: none">Bachelor degree is classified into B.Tech and B.Tech (Hon.). <p>Condition for B.Tech (Hons.)= CGPA \geq 8.0 (at the end of fourth semester)</p>
<ul style="list-style-type: none">There is discrepancy in total credit for CSE and ECE Bachelor course. CSE=190 credit ECE=179 credit	<ul style="list-style-type: none">Total credits for ECE and CSE is equal. B.Tech = 162-170 credits B.Tech (Hons.)=174-182 credits
<ul style="list-style-type: none">Non-uniformity in distribution of subjects in first year.	<ul style="list-style-type: none">Common courses for both ECE and CSE in first year.
<ul style="list-style-type: none">Non-uniformity in distribution of credits of LAB courses for CSE and ECE.	<ul style="list-style-type: none">Two credits is allocated to all laboratory courses of ECE and CSE.

II. Format of Subject codes

1) Course code AA-XYZZ is explained as

AA - Department

X-Academic year

Y-Theory/Lab; 0 ==Theory and 1== Lab

ZZ-odd/even semester; odd number == odd semester and even number == even semester

2) For project/seminar/comprehensive viva:

AA= PR

X= 1

3) For open electives:

AA= OE

Indian Institute of Information Technology, Ranchi

Curriculum for B. Tech (Hons.) and B.Tech

Breakup of the credits semester wise

Credit required for B Tech – 162-170;

Credit required for B Tech (Hons.) –174-182 (Only for Students with CGPA ≥ 8.0 at the end of 4th Semester)

Semester/ Projects	Credits - B.Tech Hons.	Credits - B.Tech
I	22	22
II	20=42	20=42
III	24=66	24=66
IV	22=88	22=88
V	24=112	20=108
VI	22=134	18=126
VII	24=158	20=146
VIII	20=178	20=166
Total	178	166

Semester wise courses

Semester I – Common for B Tech (Hons.) & B Tech.				
S.N.	CSE	ECE	L-T-P	Credits
1.	MA-1001: Mathematics-I (Calculus and Differential Equations)		3-1-0	4
2.	EC-1001: Electronic Devices & Circuits		3-0-0	3
3.	EC-1003: Electrical Technology		3-0-0	3
4.	CS-1001: Computer Programming: Concepts and Practices		3-0-0	3
5.	PH-1001: Engineering Physics		3-0-0	3
6.	HS-1001: Professional Communication		2-0-0	2
7.	EC-1101: Electronic Devices & Circuits lab		0-0-3	2
8.	CS-1101: Computer Programming Lab		0-0-3	2
9.	CA-1101: Co-Curricular Activity I		----	0
Total Credits				22

Semester II - Common for B Tech (Hons.) & B Tech.				
S.N.	CSE	ECE	L-T-P	Credits
1.	MA-1002: Mathematics-II (Probability and Statistics)		3-1-0	4
2.	EC-1002: Digital Logic & Design		3-0-0	3
3.	CS-1002: Data Structures and Programming Languages		3-0-0	3
4.	CS-1004: Discrete Mathematics		3-1-0	4
5.	HS-1002: Ethics and Human Values		2-0-0	2
6.	EC-1102: Digital Logic & Design Lab		0-0-3	2
7.	CS-1102: Data Structures Lab		0-0-3	2
9.	CA-1102: Co-Curricular Activity II		----	0
Total Credits				20

Semester III - Common for B Tech (Hons.) & B Tech.				
S. No.	CSE	ECE	L-T-P	Credits
1.	MA-2001: Mathematics-III (Complex variable, Real analysis & Linear Algebra)		3-1-0	4
2.	CS-2001: Python Programming		3-0-0	3
3.	CS-2003: Computer Organization and Architecture		3-0-0	3
4.	CS-2005: Theory of Computation	EC-2001: Analog & Linear Integrated Circuit	3-0-0	3
5.	CS-2007: Fundamentals of Algorithms	EC-2003: Circuit Analysis & Synthesis	3-0-0	3
6.	HS-2001: Management Concepts and Organizational Behaviour		2-0-0	2
7.	CS-2101: Python Programming Lab		0-0-3	2
8.	CS-2103: Computer Organization and Architecture Lab		0-0-3	2
9.	CS-2107: Algorithms Lab	EC-2101: Analog & Linear Integrated Circuit Lab	0-0-3	2
Total Credits				24

Semester IV- Common for B Tech (Hons.) & B Tech.				
S. No.	CSE	ECE	L-T-P	Credits
1.	MA-2002: Mathematics-IV (Combinatorics and Graph Theory)	EC-2002: Electromagnetic Theory	3-1-0	4
2.	EC-2004: Microprocessors and Microcontrollers		3-0-0	3
3.	EC-2006: Signals and Systems		3-0-0	3
4.	CS-2002: Compiler Design	EC-2008: Analog Communication	3-0-0	3
5.	CS-2004: Numerical Methods and Scientific Computing	EC-2010: Control System	3-0-0	3
6.	ES-2002: Environmental Science & Green Technology		2-0-0	2
7.	EC-2104: Microprocessors and Microcontrollers Lab		0-0-3	2
8.	CS-2102: Compiler Design Lab	EC-2108: Analog Communication Lab	0-0-3	2
Total Credits				22
Semester V-B Tech (Hons.) & B Tech.				

S. No.	CSE	ECE	L-T-P	Credits
1.	CS-3001: Database Management Systems		3-0-0	3
2.	CS-3003: Operating System	EC-3001: Digital Communication	3-0-0	3
3.	CS-3005: Computer Graphics & multimedia	EC-3003: Microelectronics Circuits	3-0-0	3
4.	CS-3007: Advanced Computer Architecture	EC-3005: Microwave Engineering	3-0-0	3
5.	Hons. Elective-I		3-1-0	4
6.	HS-3001: Entrepreneurship Development		2-0-0	2
7.	CS-3101: Database Management Systems lab		0-0-3	2
8.	CS-3103: Operating System Lab	EC-3101: Digital Communication Lab	0-0-3	2
9.	CS-3105: Computer Graphics & multimedia Lab	EC-3103: Microelectronics Circuits Lab	0-0-3	2
Total Credits				24 (20)

Semester VI- B Tech (Hons.) & B Tech.				
S. No.	CSE	ECE	L-T-P	Credits
1.	CS-3002: Artificial Intelligence	EC-3002: Measurement & Instrumentation	3-0-0	3
2.	CS-3004: Software Engineering	EC-3004: VLSI & MEMS Technology	3-0-0	3
3.	CS-3006: Computer Network	EC-3006: Digital Signal Processing	3-0-0	3
4.	Open Elective-I		3-0-0	3
5.	Hons. Elective-II		3-1-0	4
6.	CS-3102: Artificial Intelligence Lab	EC-3102: Measurement & Instrumentation Lab	0-0-3	2
7.	CS-3104: Software Engineering Lab	EC-3104: VLSI & MEMS Lab	0-0-3	2
8.	CS-3106: Computer Network Lab	EC-3106: Digital Signal Processing Lab	0-0-3	2
Total Credits				22(18)

Industrial Training: Students to undertake summer internships during summer break (May to July)

Semester VII- B Tech (Hons.) & B Tech.				
S. No.	CSE	ECE	L-T-P	Credits
1.	CS-4001: Cryptography and Network Security	EC-4001: Optical Communication	3-0-0	3
2.	Open Elective II		3-0-0	3
3.	Open Elective III		3-0-0	3
4.	Open Elective IV		3-0-0	3
5.	Hons. Elective III		3-1-0	4
6.	CS-4101: Cryptography and Network Security Lab	EC-4101: Optical Communication Lab	0-0-3	2
7.	PR-4101: Minor Project		----	4
8.	PR-4103: Industrial Seminar		----	2
Total Credits				24(20)

Semester VIII - Common for B Tech (Hons.) & B Tech.				
S. No.	CSE	ECE	L-T-P	Credits
1.	PR-4102: Project/Internship		----	16
2.	PR-4104: Comprehensive Viva		----	4
Total Credits				20

Legend:

L - Number of lecture hours per week

T - Number of tutorial hours per week

P - Number of practical hours per week

C - Number of credits for the course

List of Electives

Hons. Elective I (fifth semester)

Offered by ECE	Offered by CSE
1. EC-3007: Computational Intelligence 2. EC-3009: Optical Sensors 3. EC-3011: Mobile communication 4. EC-3013: Semiconductor Material & Device Characterization	1. CS-3009: Decision making and Expert System 2. CS-3011: Advanced Operating Systems 3. CS-3013: Queueing Theory and Data Networks 4. CS-3015: Game Theory

Open Elective I (in sixth semester) – open to both CSE & ECE

1. OE-3002: Embedded Systems
2. OE-3004: Sensor & Transducer

3. OE-3006: Information Theory & Coding
4. OE-3008: Wireless Communication
5. OE-3010: Parallel and Distributed Systems
6. OE-3012: Quantum Mechanics
7. OE-3014: Advanced Algorithm
8. OE-3016: Advanced Data structure
9. OE-3018: Programming in JAVA
10. OE-3020: Object Oriented System Design

Hons. Elective II (sixth semester)

Offered by ECE	Offered by CSE
<ol style="list-style-type: none"> 1. EC-3008: VLSI testing & testability 2. EC-3010: Optoelectronics & Photonics 3. EC-3012: DSP System Design 4. EC-3014: RF IC Design 	<ol style="list-style-type: none"> 1. CS-3008: Multimedia Systems 2. CS-3010: Web System and Technology 3. CS-3012: Evolutionary Computing 4. CS-3014: Introduction to Cognitive Science 5. EC-3006: Digital Signal Processing

Open Elective II/III/IV (in seventh semester) – open to both CSE & ECE

1. OE-4001: Satellite & Radar Communication
2. OE-4003: Digital System Design with VHDL
3. OE-4005: Advanced Semiconductor Devices
4. OE-4007: Optimization techniques
5. OE-4009: Research Methodology and Intellectual Property Rights
6. OE-4011: Antenna Design
7. OE-4013: Data Mining
8. OE-4015: Software Project Process and Quality Management
9. OE-4017: Advanced Computer Networks
10. OE-4019: Cyber Crime
11. OE-4021: Advances in Software Testing
12. OE-4023: Soft Computing
13. OE-4025: Lasers and Ultrafast Optics
14. OE-4027: Pattern Recognition and Classification
15. OE-4029: Machine learning
16. OE-4031: Computer Vision
17. OE-4033: Cloud Computing
18. OE-4035: Statistical Mechanics
19. OE-4037: Data Communication & Networks

Hons. Elective III (seventh semesters)

Offered by ECE	Offered by CSE
<ol style="list-style-type: none">1. EC-4003:CAD for VLSI2. EC-4005:Wireless Sensor Network3. EC-4007: Adaptive Signal Processing4. EC-4009: Robotics	<ol style="list-style-type: none">1. CS-4003: Natural Language Processing2. CS-4005: Quantum Computing3. CS-4007: Big Data Analytics4. CS-4009: Advanced Database Management Systems5. EC-4009: Robotics

Note:

1. Others elective courses as decided by committee to be taken from NPTEL/MOOCs/SWAYAM/COURSERA or any other online platform. Course codes will be decided later as per the format.
2. Elective courses may be added or removed later on the recommendation of competent authority.