



B. TECH

ARTIFICIAL INTELLIGENCE & DATA SCIENCE CURRICULUM & SYLLABUS 2025 REGULATION

B.Tech

ARTIFICIAL INTELLIGENCE

AND DATA SCIENCE

2025 REGULATION

CURRICULUM & SYLLABUS

SEMESTER 1

CURRICULUM

SLOT	COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	C
A	BST	B251904/MA100A	Mathematics For Information Science-1	3	1	0	0	2	3
B	BSE	B251904/CH910B	Chemistry For Information Science	3	0	0	2	3	4
C	EST	B251907/CN100C	Engineering Graphics and Computer Aided Drawing	4	0	0	0	2	3
D	EST	B251802/CN900D	Foundations of Artificial Intelligence and Data Science	3	1	0	0	2	3
E	ESE	B251905/CN110E	Algorithmic Thinking With Python	2	1	0	2	3	4
K	HMT	B251909/CN910K	Life Skills and Professional Communication	1	1	0	0	0	1
U	ESL	B251703/CN930U	IT Workshop	0	0	0	2	0	1
I	Skill Enhancement Course: NASSCOM or equivalent								1
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work, C- Credit)									

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	3-1-0-0-2	VERSION	25/1	CREDITS	3
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B251904/MA100A	Mathematics For Information Science-1	BST
PRE-REQUISITE		
The basic knowledge of single variable calculus.		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	90	C	CIA	ESE	Total	CIA	ESE	Total	
3	1	0	0	2		90	3	40	60	100	-	-	-
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Single Variable Calculus	Limits of function values, continuity at a point, continuous functions, rates of change: derivative at a point, derivative as a function, second and higher order derivatives, instantaneous rates of change, chain rule, implicit differentiation, tangents and normal lines, linearization, extreme values of functions on closed intervals, the Mean Value Theorem (without proof), concavity: the second derivative test for concavity. (Text 1 - Relevant topics from sections 2.2, 2.5, 3.1, 3.2, 3.3, 3.4, 3.6, 3.7, 3.9, 4.1, 4.2 4.4)	10
2	Partial derivatives- 1	Functions of several variables: domains and ranges, level curves of two variables, limits for functions of two variables, continuity for functions of two variables, partial derivatives of a function of more than two variables, partial derivatives and continuity, second order partial derivatives, the mixed derivative theorem, the chain rule: functions of two variables. (Text 1 - Relevant topics from sections 14.1, 14.2, 14.3, 14.4)	10
3	Partial derivatives- 2	The chain rule: functions of three variables, directional derivatives in the plane, interpretation of the directional derivative, gradient, properties of the directional derivative, the linearization of a function of two variables, local extreme values for functions of two variables: relative extrema, first derivative theorem for local extreme values, critical point, saddle point, second derivative test for local extreme values, absolute maxima and minima on closed bounded regions. (Text 1 - Relevant topics from sections 14.4, 14.5, 14.6, 14.7)	10
4	Optimization Techniques	Constrained maxima and minima, the method of Lagrange multipliers with one constraint, the method of Lagrange multipliers with two constraints, method of steepest descent (only two variables), LPP-formation, solution of LPP using graphical methods. (Text 1 - Relevant topics from section 14.8, Text 2 - Relevant topics from sections 22.1, 22.2.)	10

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1.	Thomas' Calculus	Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw, Bogacki	Pearson, 15th edition
2.	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons, 10th edition

Reference			
Sl. No.	Title of Book	Author	Publication
1.	Calculus	Howard Anton, Irl Bivens, Stephens Davis	Wiley, 10th edition, 2012
2.	Optimization: Algorithms and Applications	Rajesh Kumar Arora	CRC Press, 1st edition 2015
3.	Multivariable Calculus	Ron Larson, Bruce Edwards	Brooks/Cole, Cengage Learning, 10th edition, 2014
4.	Calculus & Its Applications	Goldstein, Schneider, Lay, Asmar	Pearson, 14th edition, 2018
5.	Bird's Higher Engineering Mathematics	John Bird	Taylor & Francis, 9th edition, 2021
6.	Higher Engineering Mathematics	B.V Ramana	McGraw-Hill Education, 39th edition, 2023

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	3-0-0-2-3	VERSION	25/1	CREDITS	4
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B251904/CH910B	Chemistry For Information Science	BSE
PRE-REQUISITE		
Concepts of chemistry introduced at the plus two level especially Electrochemistry, Polymers, and Volumetric Analysis.		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
					120	C	Theory			Practical			Total
L	T	J	P	S			CIA	ESE	Total	CIA	ESE	Total	
3	0	0	2	3		4	25	60	85	15	0	15	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Electrochemistry and Corrosion	Electrochemical Cell-Electrode potential- Nernst equation - Reference electrodes -Electrochemical series - Glass Electrode & pH Measurement-Conductivity. Li-ion battery & H ₂ -O ₂ fuel cell. Corrosion -Electrochemical corrosion - Galvanic series - Corrosion control methods - Electroplating of copper - Electroless plating of copper.	9
2	Materials for Electronic Applications	Nanomaterials - Classification -Synthesis -Carbon Nanotubes, Graphene & Carbon Quantum Dots - Polymers - Fire Retardant Polymers- Conducting Polymers-Polyaniline-Organic electronic materials and devices-Organic Light Emitting Diode (OLED) & Dye-Sensitized Solar Cells (DSSC). Materials used in Quantum computing Technology, Super capacitors, Spintronics.	9
3	Molecular Spectroscopy and Analytical Techniques	Spectroscopy-Types of spectra- Molecular energy levels - Beer Lambert's law - Electronic Spectroscopy-Instrumentation-Applications - Vibrational spectroscopy -Number of vibrational modes - Vibrational modes of CO ₂ and H ₂ O - Applications. Thermal Analysis: Dielectric Thermal Analysis (DETA) of Polymers-Electron Microscopic Techniques: SEM	9
4	Environmental Chemistry	Water characteristics - Hardness -Degree of hardness (Numericals)- Water softening methods - Water disinfection methods - Dissolved oxygen (DO), BOD and COD. Waste Management: Sewage water treatment- E Waste-Methods of disposal. Chemistry of climate change- Greenhouse Gases and Green house effect- Sustainable Development Goals.	9

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Engineering Chemistry	B. L. Tembe, Kamaluddin, M. S. Krishnan	NPTEL Web-book
2	Physical Chemistry	P. W. Atkins	Oxford University Press
3	Instrumental Methods of Analysis	H. H. Willard, L. L. Merritt	CBS Publishers
4	Engineering Chemistry	Jain & Jain	Dhanpath Rai Publishing Company

Reference			
Sl. No.	Title of Book	Author	Publication
1	Fundamentals of Molecular Spectroscopy	C. N. Banwell	McGraw-Hill
2	Principles of Physical Chemistry	B. R. Puri, L. R. Sharma, M. S. Pathania	Vishal Publishing Co
3	Introduction to Spectroscopy	Donald L. Pavia	Cengage Learning India Pvt. Ltd
4	Polymer Chemistry: An Introduction	Raymond B. Seymour, Charles E. Carraher	Marcel Dekker Inc
5	The Chemistry of Nanomaterials: Synthesis, Properties and Applications	Prof. Dr. C. N. R. Rao, Prof. Dr. h.c. mult. Achim Müller, Prof. Dr.A. K. Cheetham	Wiley-VCH Verlag GmbH & Co. KGaA
6	Organic Electronics Materials and Devices	Shuichiro Ogawa	Springer Tokyo
7	Principles and Applications of Thermal Analysis	Gabbot, P	Oxford: Blackwell Publishing

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	4-0-0-0-2	VERSION	25/1	CREDITS	3
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B251907/CN100C	Engineering Graphics and Computer Aided Drawing	EST
PRE-REQUISITE		
NIL		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	90	C	CIA	ESE	Total	CIA	ESE	Total	
4				30		90	3	40	60	100			
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Orthographic projection of points and lines	Introduction: Relevance of technical drawing in engineering field. Orthographic Projection of points in different quadrants, Projection of straight lines inclined to one plane and inclined to both planes. Trace of a line. (Line rotation method only)	12
2	Orthographic projection of solids	Orthographic Projection of Simple solids such as Triangular, Rectangular, Square, Pentagonal and Hexagonal Prisms and Pyramids, Cube, Cone and Cylinder. Projection of solids in simple positions including profile view. Projection of solids with axis inclined to one of the reference planes and with axis inclined to both reference planes.	12
3	Sections of solids and Development of surfaces	Sections of Solids: Sections of Prisms, Pyramids, Cube, Cone and Cylinder with axis in vertical position and cut by different section planes. True shape of the sections. (Exclude true shape given problems). Development of Surfaces: Development of surfaces of the solids and solids cut by different section planes. (Exclude problems with through holes)	16
4	Isometric projection	Isometric Projection: Isometric scale- Isometric View and Projections of Prisms, Pyramids, Cone, Cylinder, Sphere, Hemisphere and their combinations.	10
5	Computer Aided Drawing (CAD)	Computer Aided Drawing (CAD): Introduction, Role of CAD in design and development of new products, Advantages of CAD. Creating two-dimensional drawing with dimensions using suitable software. (CAD, only internal evaluation)	10

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Engineering Graphics	Varghese, P. I.	V I P Publishers
2	Engineering Graphics	Benjamin, J.	Pentex Publishers
3	Engineering Graphics	John, K. C.	Prentice Hall India Publishers
4	Engineering Drawing	Bhatt, N., D.	Charotar Publishing House Pvt Ltd.

5	Engineering Graphics	Anilkumar, K. N.	Adhyuth Narayan Publishers
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Reference			
Sl. No.	Title of Book	Author	Publication
1	Engineering Graphics with AutoCAD,	Kulkarni, D. M., Rastogi, A. P. and Sarkar, A. K.,	Prentice Hall India Publishers
2	Engineering Drawing & Graphics	Venugopal, K.	New Age International Publishers
3	Engineering Drawing	Parthasarathy, N. S., and Murali, V.	Oxford University Press

COURSE DESCRIPTION							
Regulation	2025	L-T-J-P-S	3-1-0-0-2	Version	25/1	Credits	3
<i>(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)</i>							

Course Code	Course Name	Course Category
B251802/CN900D	Foundations of Artificial Intelligence and Data Science	EST
Pre-requisite		
NIL		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					Credit	Hours / Semester	Examination Scheme		
							Theory		
L	T	J	P	S	C		CIA	ESE	Total
3	1	0	0	2	3	90	40	60	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination									

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Introduction to Artificial Intelligence	Intelligent Systems , Problem Solving by Searching	11
2	Knowledge Representations & Reasoning	Knowledge Representations schemes, Reasoning techniques, First Order Logic	12
3	Introduction to Data Science	Types of Data, Descriptive statistics	13
4	Data pre-processing & EDA	Data quality, Data integration , data reduction techniques.	8

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Artificial Intelligence – A Modern Approach	Stuart Russel, Peter Norvig	Pearson Education , 4/e, 2022
2	Data mining concepts and Techniques.	Jiawei Han, Micheline Kamber, Jian Pei	Morgan Kaufmann Publishers. 3/e 2011
3	Fundamentals of Data Science	Sanjeev J. Wagh, Manisha S. Bhende, et al	CRC Press, 2/e, 2021

Reference			
Sl. No.	Title of Book	Author	Publication
1	Artificial Intelligence	Elaine Rich, Kevin Knight, S.B.Nair	MedTech Science Press 2/e, 2010
2	Principles of Artificial Intelligence	Nils J Nilsson	Illustrated Reprint Edition, Springer Heidelberg ,2014
3	Data Science from Scratch: First Principles with Python	Joel Grus	O'Reilly Media, 2/e, 2019
4	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes McKinney	O'Reilly Media, 3/e, 2022

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	2-1-0-2-3	VERSION	1	CREDITS	4
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B251905/CN110E	Algorithmic Thinking With Python	ESE
PRE-REQUISITE		
Nil		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	120	C	CIA	ESE	Total	CIA	ESE	Total	
2	1	0	2	3		100	4	25	60	85	15	0	15
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Foundations of Problem-Solving and Python Basics	Problem-Solving Strategies, The Problem-Solving Process, Essentials of Python Programming	10
2	Algorithm Design with Pseudocode and Flowcharts	Pseudocode, Flowcharts	10
3	Modular Problem-Solving with Python: Control Structures to Recursion	Selection and Iteration, Decomposition and Modularization, Recursion	13
4	Fundamental Computational Approaches to Problem-Solving	Divide-and-Conquer Approach, Dynamic Programming Approach, Greedy Algorithm Approach	12

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
•	Problem solving & programming concepts	Maureen Sprankle, Jim Hubbard	Pearson
•	How to Solve It: A New Aspect of Mathematical Method	George Pólya	Princeton University Press

Reference			
Sl. No.	Title of Book	Author	Publication
1	Creative Problem Solving: An Introduction	Donald Treffinger., Scott Isaksen, Brian Stead-Doval	Prufrock Press
2	Psychology (Sec. Problem Solving.)	Spielman, R. M., Dumper, K., Jenkins, W., Lacombe, A., Lovett, M., & Perlmutter, M	H5P Edition
3	Computational Thinking: A Primer for Programmers and Data Scientists	G Venkatesh Madhavan Mukund	Mylspot Education Services Pvt Ltd
4	Computer Arithmetic Algorithms	Koren, Israel	AK Peters/CRC Press

COURSE DESCRIPTION							
REGULATION	2025	L-T-J-P-S	1-1-0-0-0	VERSION	25/1	CREDITS	1
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
B251909/CN900K	LIFE SKILLS AND PROFESSIONAL COMMUNICATION	HMT
PRE-REQUISITE		
NIL		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					Credit	Hours / Semester	Examination Scheme		
							Theory		
L	T	J	P	S	C		CIA	ESE	Total
1	1	0	0	0	1	30	100	-	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination									

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Personal Growth & Self-management	1.Group formation and self-introduction 2. Preparation of Gantt chart 3. Online personality development test 4.Role-storming exercise	7
2	Workplace & Interpersonal Skills	1.Presentation on instances of empathy and emotional intelligence 2.Networking with professionals to develop workplace skills through LinkedIn 3. Minutes of the Meeting 4.Preparation of Action Plan & Resume Preparation	7
3	Problem-Solving & Creative thinking	1.Identifying real-life problem that requires a technical solution 2. Six thinking hat exercises 3. Report Writing 4.Video presentation on diversity aspects	8
4	English Language communication & Professional Development	1.Listening test. 2.Activities to improve English vocabulary of students 3. Group Discussion 4.Video content for podcasts on technological interventions/research work tried out in Kerala context	8

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Life Skills & Personality Development	Maithry Shinde et.al.	Cambridge University Press
2	Emotional Intelligence: Why it can matter more than IQ	Daniel Goleman	Bloomsbury Publishing PLC
3	Think Faster, Talk Smarter: How to speak successfully when you are put on the spot	Matt Abrahams	Macmillan Business
4	Deep Work: Rules for focused success in a distracted world	Cal Newport	PIATKUS

5	Effective Technical Communication	Ashraf Rizvi	McGraw Hill Education
Reference			
Sl. No.	Title of Book	Author	Publication
1	Life Skills for Engineers	Remesh S., Vishnu R.G	Ridhima Publication
2	Soft Skills & Employability Skills	Sabina Pillai and Agna Fernandez	Cambridge University Press
3	Guide to writing as an Engineer	David F. Beer and David McMurrey	John Willey. New York
4	LinkedIn Profile Optimization	Donna Serdula	

COURSE DESCRIPTION							
Regulation	2025	L-T-J-P-S	0-0-0-2-0	Version	25/1	Credits	1
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

Course Code	Course Name	Course Category
B251703/CN930U	IT WORKSHOP	ESL
Pre-requisite		
NIL		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					Credit	Hours / Semester	Examination Scheme		
							Practical		
L	T	J	P	S	C		CIA	ESE	Total
			2		1		60	40	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination									

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Computer Systems & Linux Environment	Computer Hardware and Peripherals, Boot Process & OS Installation, Working with Text editors (Vim/ emacs/ nano /Vi), Program compilation and debugging, Shell Programming (Bash)	12
2	Web Development Basics	HTML structure, tags, links, CSS styling and layout, Basic JavaScript interactivity, Hosting a web page locally	4
3	Development Environments Repositories & Documentation	Git basics: init, clone, commit, push, branch, Documentation with LaTeX: reports, equations, tables, Perform Import data, perform statistical analysis and visualize it using Matlab, Understand the concept of image representation as 2D matrix and perform image operations (imread()`, `imresize()`, `rgb2gray()`, `imshow()`, `imhist()`)	6
4	Networking and Security	Configure basic network and monitor it using Wireshark, Various types of cyber threats, its risk factors and defence mechanisms.	4

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	The Architecture of Computer Hardware, Systems Software, & Networking: An Information Technology Approach.	Irv Englander	Wiley, 5/e, 2014
2	Mastering Git : Attain expert level proficiency with Git for enhanced productivity and efficient Collaboration	Jakub Narebski	Packt ,1/e, 2016
3	Web Design with HTML, CSS, JavaScript, and JQuery	Jon Duckett	Wiley, 1/e, 2014
4	MATLAB: Data Analysis and Visualization	Antonio Siciliano	World Scientific Publishing Co., 2008

Reference			
Sl. No.	Title of Book	Author	Publication
1	<i>Linux Command Line and Shell Scripting Bible,</i>	Richard Blum and Christine Bresnahan	Wiley, 2021, 4th Edition
2	Learning the vi and Vim Editors	Arnold Robbins	O'Reilly Media, 2016.
3	<i>Learning GNU Emacs,</i>	Debra Cameron	O'Reilly Media, 2004.
4	Network Security Essentials: Applications and Standard	William Stallings	Pearson, 2023
5	Digital Image Processing Using MATLAB	Rafael C. Gonzalez et al	Pearson