

**Vidya Pratishthan's
Kamalnayan Bajaj Institute of Engineering
and Technology, Baramati.**



**Faculty of Science and Technology
Board of Studies
Artificial Intelligence and Data
Science
Syllabus
Exit Courses
Artificial Intelligence and Data
Science
(w.e.f. AY: 2023-24)**

Exit Course Syllabus: First Year (F.Y. B. Tech.) Artificial Intelligence and Data Science

w.e.f. AY:2023-2024

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
		TH	PR	TUT	Acti vity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
EAI23101	Skill Based Courses (Online/Offline)	-	4	-	10	-	-	20	-	30	-	-	2	-	2
EAI23102	Work Based Voc. Course (Online/Offline)	-	4	-	10	-	-	20	-	30	-	-	2	-	2
EAI23103	Internship / Apprenticeship	-	25	-	50	-	-	50	-	30	-	-	4	-	4
Total		-	33	-	70	-	-	90	-	90	-	-	8	-	8

Skill Based Courses (Online/Offline)		Work Based Voc. Course (Online/Offline)	
EAI23101 – A	Programming for Problem Solving (Offline)	EAI23102 - A	IT Workshop (Offline)
EAI23101 – B	Object Oriented Programming Through JAVA (Offline)	EAI23102 - B	Data Visualization (Offline)
EAI23101 – C	Introduction to Object Oriented Programing (Online)	EAI23102 - C	The Joy of Computing using Python (Online)
EAI23101 – D	Computer Graphics (Online)	EAI23102 - D	Decision Making with Spreadsheet (Online)
EAI23101 – E	Learn LaTeX - The Complete LaTeX Course(Online)		

EAI23101 Skill Based Courses Online / Offline - F. Y. B. Tech Exit		
Teaching Scheme:	Credits:02	Examination Scheme:
PR: 04 Hrs/Week		Course Activity: 10 Marks
		Term Work: 20 Marks
		Oral Exam: 30 Marks

Complete any one course from the following courses.

Offline Skill Based Courses

1. Programming for Problem Solving (EAI23101 – A)

Course Objectives:

- To introduce the core components of Python programming language.
- To study library packages to write applications using python.
- To study GUI, exception handling and debugging python program.

Course Outcomes:

At the end of this course, students will be able to:

- CO1.** Write Python scripts using procedure-oriented approach of writing a computer program.
- CO2.** Write Python scripts using Object oriented approach of writing a computer program.
- CO3.** Exhibit ability to use Python's standard library packages to provide solution to a given problem.

SYLLABUS

UNIT – I - Introduction to Python:

Introducing the Python Interpreter, Program Execution, Execution Model Variations, The Interactive Prompt, System Command Lines and Files

UNIT – II Introduction to Python Programming Constructs:

Data types and variables, Collection data types, Control structures, loops and functions, Lambdas, Generators, Exception Handling, String handling, Scope of variables, Modules, Packages, Command line arguments. Built-in: Functions, Constants, Types, Exceptions.

UNIT – III Introduction to Object Oriented Programming in Python:

Classes, Instance Objects, Method Objects, Class and Instance Variables, Attributes and methods, Inheritance and polymorphism.

UNIT – IV Python Standard Library Modules and Packages:

Regular expression operations, Basic date and time types, General calendar-related functions, Container datatypes, NumPy, Shallow and deep copy operations, Mathematical functions, Generate pseudo-random numbers, File and Directory Access Data Persistence: CSV File

Reading and Writing, Configuration file parser, Logging facility for Python.

List of Experiment:

Minimum 5 assignments based on above topics.

1. The assignments should test and develop student's practical proficiency and ability to use Python standard library modules and packages efficiently in writing effective code for varied applications scenarios & requirements, use cases.
2. Use of IDEs like PyCharm, Eclipse with PyDev, Jupyter Notebook for Interactive development and debugging of Python applications is highly recommend to enhance hands on skills in Python Programming of Students
3. Every assignment shall be performed under Python 2.x or 3.x runtime environment configured using any of the following tools
 - i) Pyenv
 - ii) Virtualenv
 - iii) Anaconda

TEXT BOOKS:

T1. Programming in Python 3, Mark Summerfield, Second Edition

REFERENCE BOOKS:

- R1. Python Cookbook, David Beazley and Brian K. Jones, Third Edition, Shroff Publishers
& Distributors Pvt. Ltd., ISBN :978-93-5110-140-6
- R2. Learning Python, MarkLutz, 5th edition
- R3. Programming Python (English), MarkLutz, 4th Edition
- R4. Testing Python, David Sale, Wiley India (P) Ltd., ISBN :978-81-265-5277-1

E-RESOURCES:

- E1. Python 2.7.16 documentation - <https://docs.python.org/2/>
- E2. Python 3.7.3 documentation - <https://docs.python.org/3/>

2. OBJECT ORIENTED PROGRAMMING THROUGH JAVA (EAI23101 – B)

Course Objectives:

- To Understand the basic object-oriented programming concepts and apply them in problem solving.
- To Illustrate inheritance concepts for reusing the program.
- To Demonstrate multitasking by using multiple threads and event handling.
- To Develop data-centric applications using JDBC.
- To Understand the basics of java console and GUI based programming.

Course Outcomes: -

On completion of the course, learner will be able to

- CO1.** Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
- CO2.** Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.
- CO3.** Use multithreading concepts to develop inter process communication.
- CO4.** Understand the process of graphical user interface design and implementation using AWT or swings.
- CO5.** Develop applets that interact abundantly with the client environment and deploy on the server.

SYLLABUS

UNIT- I Object oriented thinking and Java Basics:

Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods.

UNIT-II Inheritance, Packages and Interfaces:

Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance costs of inheritance. Polymorphism-method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces.

UNIT-III Exception handling and Multithreading:

Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle.

UNIT-IV Event Handling:

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices, lists panels – scroll pane, dialogs, menu bar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

Text Books:-

T1. Java the complete reference, 7th edition, Herbert schildt, TMH.

T2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

Reference Books: -

R1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.

R2. An Introduction to OOP, third edition, T. Budd, Pearson education.

R3. Introduction to Java programming, Y. Daniel Liang, Pearson education.

R4. An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.

R5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.

Note: 1.

Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of the Eclipse platform.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. A) Develop an applet in Java that displays a simple message. B) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First Thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

Online Skill Based Courses

Sr. No.	Course Code	NPTEL Course	Name of Course Coordinator	Coordinating Institute	Duration	No. of Credits
1	EAI23101 – C	Object oriented analysis and design	Dr. Partha Pratim Das	IIT Kharagpur	8 weeks	2
2	EAI23101 - D	Computer Graphics	Prof. Samit Bhattacharya	IIT Guwahati	8 Weeks	2
3	EAI23101 – E	Learn LaTeX The Complete LaTeXCourse	Dr. Gary White	Udemy	8 Weeks	2

Online Skill Based Courses Links:

1. EAI23101 –C: https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. EAI23101 –D: https://onlinecourses.nptel.ac.in/noc20_cs90/preview
3. EAI23101– E: <https://www.udemy.com/course/learn-latex-the-complete-latex-course/>

EAI23102 Work Based Voc. Course (Online/Offline) - F. Y. B. Tech Exit		
Teaching Scheme:	Credits:02	Examination Scheme:
PR: 04 Hrs/Week		Course Activity: 10 Marks
		Term Work: 20 Marks
		Oral Exam: 30 Marks

Complete any one course from the following courses.

Offline Work Based Voc. Courses

1. IT WORKSHOP (EAI23102 – A)

Course Objective:

- The IT Workshop for engineers is a training lab course spread over 60 hours.
- The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

Course Outcome:

- CO1.** Perform Hardware troubleshooting
- CO2.** Safeguard computer systems from viruses/worms.
- CO3.** Document/ Presentation preparation.
- CO4.** Perform calculations using spreadsheets.

PC Hardware:

- Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the Block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
- Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.
- Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Internet & World Wide Web:

- Task 1:** Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
- Task 2:** Web Browsers, Surfing the Web: Students customize their web browsers with

the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

LaTeX and WORD:

Task 1: Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Excel Orientation:

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text .

Task 2: Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting PowerPoint.

Reference Books:

R1.Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech

R2.The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech

R3.Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

R4.PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)

R5.LaTeX Companion – Leslie Lamport, PHI/Pearson.

R6.IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

R7.IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson.

2. Data Visualization -R Programming

(EAI23102 – B)

Course Objective:

- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization.
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

Course Outcome:

- CO1.** Understand How to import data into Tableau.
- CO2.** Understand Tableau concepts of Dimensions and Measures.
- CO3.** Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- CO4.** Create a Dashboard that links multiple visualizations.
- CO5.** Use graphical user interfaces to create Frames for providing solutions to real world problems.

Lab Experiments:

1. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel.
2. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
3. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
4. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.
5. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

Reference Books:

- R1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
- R2. Programming for Data Science by Roger D. Peng (References)
- R3. The Art of R Programming by Norman Matloff Cengage Learning India.

Online Work Based Voc. Courses

Sr. No.	Course Code	NPTEL Course	Name of Course Coordinator	Coordinating Institute	Duration	No. of Credits
1	EAI23102 - C	The Joy of Computing using Python	Prof. Sudarshan Iyengar	IIT Ropar	12 Weeks	3
2	EAI23102 - D	Decision Making with Spreadsheet	Prof.Ramesh Anbanandam	IIT Roorkee	12 Weeks	3

Online Work Based Voc. Courses Links: -

1. EAI23102 – C: https://onlinecourses.nptel.ac.in/noc22_cs122/preview
2. EAI23102 – D: <https://archive.nptel.ac.in/courses/110/107/110107157/>

EAI23103 Internship / Apprenticeship - F. Y. B. Tech Exit		
Teaching Scheme:	Credits:04	Examination Scheme:
PR: 25 Hrs/Week		Course Activity: 50 Marks
		Term Work: 50 Marks
		Oral Exam: 30 Marks

Course Objective:

- Expose students to the engineer's responsibilities and professional ethics from social, economic and administrative view.
- Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
- Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes:

On completion of the internship, learner will be able to

CO1. To develop professional competence through internship.

CO2. To apply academic knowledge in a personal and professional environment.

CO3. To build the professional network and expose students to future employees.

CO4. Apply professional and societal ethics in their day-to-day life.

Guidelines to the students:

Any absenteeism by students during their internship should be informed immediately to the mentor/reporting manager and the HOD. No special considerations will be accepted. Student cannot take leave for activities. The monthly attendance should be duly submitted to the HOD by the student.

Internship Diary / Internship Workbook:

Student must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The student should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the student along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. Internship Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded
- Thought process and recording techniques used
- Organization of the information.

Internship Report:

The report shall be presented covering following recommended fields but limited to:

- Title/Cover Page
- Internship completion certificate.
- Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.
- Index/Table of Contents
- Introduction
- Title/Problem statement/objectives
- Motivation/Scope and rationale of the study
- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)

Exit Course Syllabus: Second Year (S.Y. B. Tech.) Artificial Intelligence and Data Science

w.e.f. AY:2023-2024

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits				
		TH	PR	TUT	Activity	IS E	ES E	TW	PR	OR	Total	TH	PR	TU	Total	
EAI23201	Skill Based Courses (Online/Offline)		4		10			20		30				2		
EAI23202	Mini Project		4		10			20		30				2		
EAI22203	Internship		25		50			50		30				4		
Total			33		70			90		90				8		

Skill Based Courses (Online/Offline)	
EAI23201 - A	Fundamentals of Data Structures (Offline)
EAI23201 - B	Programming, Data Structures And Algorithms Using Python(Online)
EAI23201 - C	Python for Data Science(Online)
EAI23201 - D	Introduction to Database Systems(Online)
EAI23201- E	Data Science for Engineers(Online)

EAI23201 Skill Based Courses Online / Offline - S. Y. B. Tech Exit		
Teaching Scheme:	Credits:02	Examination Scheme:
PR: 04 Hrs/Week		Course Activity: 10 Marks
		Term Work: 20 Marks
		Oral Exam: 30 Marks

Complete any one course from the following courses.

Offline Skill Based Courses

1. Fundamentals of Data Structures (EAI23201 – A)

Course Objectives:

- To understand the standard and abstract data representation methods.
- To acquaint with the structural constraints and advantages in usage of the data.
- To understand various data structures, operations on it and the memory requirements

Course Outcomes:

At the end of this course, students will be able to:

- CO1. Design** the algorithms to solve the programming problems, **identify** appropriate algorithmic strategy for specific application, and **analyze** the time and space complexity
- CO2. Discriminate** the usage of various structures, **Design/Program/Implement** the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.
- CO3. Demonstrate** use of sequential data structures- Array and Linked lists to store and process data.

SYLLABUS

UNIT – I - Introduction to Algorithm and Data Structures:

Introduction: From Problem to Program (Problem, Solution, Algorithm, Data Structure and Program). Data Structures: Data, Information, Knowledge, and Data structure, Abstract Data Types (ADT), Data Structure Classification. **Algorithms:** Problem Solving, Introduction to algorithm, Characteristics of algorithm, Algorithm design tools: **Complexity of algorithm:** Space complexity, Time complexity, Asymptotic notation- Big-O, Theta and Omega, finding complexity using step count method, Analysis of programming Constructs-Linear, Quadratic, Cubic, Logarithmic.

UNIT – II - Linear Data Structure Using Sequential Organization

Concept of Sequential Organization, Overview of Array, Array as an Abstract Data Type, Operations on Array, Merging of two arrays, Storage Representation and their Address Calculation: Row major and Column Major, Multidimensional Arrays: Two-dimensional arrays, n-dimensional arrays. Concept of Ordered List.

UNIT – III Searching and Sorting:

Searching: Search Techniques-Sequential Search/Linear Search, Variant of Sequential Search- Sentinel Search, Binary Search, Fibonacci Search, and Indexed Sequential Search.

Sorting: Types of Sorting-Internal and External Sorting, General Sort Concepts-Sort Order, Stability, Efficiency, and Number of Passes, Comparison Based Sorting Methods-Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Shell Sort,

Non-comparison Based Sorting Methods-Radix Sort, Counting Sort, and Bucket Sort, Comparison of All Sorting Methods and their complexities.

List of Experiment:

Minimum 5 assignments based on above topics.

1. Write a Python program that computes the net amount of a bank account based a transaction log from console input. The transaction log format is shown as following:
D 100 W 200 (Withdrawal is not allowed if balance is going negative. Write functions for withdraw and deposit) D means deposit while W means withdrawal.
2. Write a Python program for department library which has N books, perform different functions.
3. Write a Python program to compute Different operations on String.
4. Write a Python program to compute following computation on matrix:
A) Addition of two matrices B) Subtraction of two matrices
c) Multiplication of two matrices d) Transpose of a matrix
5. Write a Python program to store first year percentage of students in array. Write function for sorting array of floating point numbers in ascending order using
i) Selection Sort ii) Bubble sort and display top five scores.

TEXT BOOKS:

T1. Horowitz, Sahani, Dinesh Mehata, “Fundamentals of Data Structures in C++”, Galgotia Publisher, ISBN: 8175152788, 9788175152786.

T2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley Publication, ISBN: 978-1-118-29027-9

REFERENCE BOOKS:

R1. Steven S S. Skiena, “The Algorithm Design Manual”, Springer, 2nd ed. 2008 Edition, ISBN- 13: 978-1849967204, ISBN-10: 1849967202.

R2. Allen Downey, Jeffery Elkner, Chris Meyers, “How to think like a Computer Scientist: Learning with Python”, Dreamtech Press, ISBN: 9789351198147.

E-RESOURCES:

E1. <https://www.ebooks.com/en-us/book/95777110/Python-data-structures-and-algorithms/benjamin-baka/>

Online Skill Based Courses

Sr. No.	Course Code	NPTEL Course	Name of Course Coordinator	Coordinating Institute	Duration	No. of Credits
1	EAI23201 - B	Programming, Data Structures And Algorithms Using Python	Prof. Madhavan Mukund	IITM	8 week	2
2	EAI23201 - C	Python for Data Science	Prof. Rangunathan Rengasamy	IITM	4 week	1
3	EAI23201 - D	Introduction to Database Systems	Prof. Sreenivasa Kumar	IITM	12 week	3
4	EAI23201 - E	Data Science for Engineers	Prof. Rangunathan Rengasamy Prof. Shankar Narasimhan	IITM	8 week	2

Online Skill Based Courses Links: -

1. EAI23201 – B: - https://onlinecourses.nptel.ac.in/noc24_cs45/preview
2. EAI23201 – C: - https://onlinecourses.nptel.ac.in/noc24_cs54/preview
3. EAI23201 – D: - https://onlinecourses.nptel.ac.in/noc24_cs55/preview
4. EAI23201 – E: - https://onlinecourses.nptel.ac.in/noc24_cs53/preview

EAI23202 Mini Project – S.Y. B. Tech Exit		
Teaching Scheme:	Credits:02	Examination Scheme:
PR: 04 Hrs./Week		Course Activity: 10 Marks
		Term Work: 20 Marks
		Oral Exam: 30 Marks

Course Objectives:

- To plan for various activities of the project and distribute the work amongst team members.
- To develop student’s abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.

Course Outcome:

On completion of the course, student will be able to

CO1. Understand, plan and execute a Mini Project with team.

CO2. Prepare a technical report based on the Mini project.

CO3. Deliver technical seminar based on the Mini Project work carried out.

Execution of Mini Project:

- Project designs ideas can be necessarily adapted from recent issues
- Use of Hardware devices/components/materials is mandatory.
- Assembly of components and enclosure design is mandatory.

Domain:

- Artificial Intelligence
- Data Science
- Machine Learning
- Deep Learning
- Cloud Computing
- Internet of Thing(IOT)

Topics for the project work: Any modern/novel/advanced techniques related with AIDS field.

Report writing: A project report with following contents shall be prepared:

- Title
- Introduction

- Scope of the work
- Problem Statement
- Selection of materials, calculations
- Casting/Testing/Modelling Procedures
- Results & Discussions
- Conclusions
- References

EAI23203 Internship – S.Y. B. Tech Exit		
Teaching Scheme:	Credits:04	Examination Scheme:
PR: 25 Hrs./Week		Course Activity: 50 Marks
		Term Work: 50 Marks
		Oral Exam: 30 Marks

Pre-requisites: Fundamentals of Artificial Intelligence and Data Science covered in earlier courses

Course Objective:

- To encourage and provide opportunities for students to get professional experience through internships.
- To create awareness of social, economic and administrative considerations in the working environment of industry organizations.
- To get familiar with various technologies and tools used in industries for development of their applications.

Course Outcomes: On successful completion of this course, the learner will be able to:

CO1. To demonstrate professional competence through industry internship.

CO2. To apply knowledge gained through academics to a professional environment during internship.

CO3. To select appropriate technology and tools to solve a given real time problem.

CO4. To demonstrate abilities of a responsible professional and use ethical practices in day today life.

CO5. To create professional and social network and develop relationships with industry people and get exposure to future employers.

CO6. To explore various career opportunities in different domains and decide career goals.

Guidelines to the students:

Any absenteeism by students during their internship should be informed immediately to the mentor/reporting manager and the HOD. No special considerations will be accepted. Student cannot take leave fest activities. The monthly attendance should be duly submitted to the HOD by the student.

Internship Diary / Internship Workbook:

Student must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The student should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the student along

with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. Internship Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded.
- Thought process and recording techniques used.
- Organization of the information.

Internship Report:

The report shall be presented covering following recommended fields but limited to:

- Title/Cover Page
- Internship completion certificate.
- Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.
- Index/Table of Contents
- Introduction
- Title/Problem statement/objectives
- Motivation/Scope and rationale of the study
- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)

Exit Course Syllabus: Third Year (T.Y. B. Tech.) Artificial Intelligence & Data Science														
w.e.f. AY:2023-2024														
Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks						Credits			
		TH	PR	TU T	Act i vity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT
EAI23301	Skill Based Courses (Online/Offline)		4		10			20		30			2	
EAI23302	Mini Project		4		10			20		30			2	
EAI23303	Internship		25		50			50		30			4	
Total			33		70			90		90			8	

Skill Based Courses (Online/Offline)	
EA I23301 – A	Computer Networks (Offline)
EAI23301 - B	Natural Language Processing (Online)
EAI23301 - C	Deep Learning (Online)
EAI23301 - D	Data Science For Engineers (Online)

EAI23301 Skill Based Courses Online / Offline – T.Y. B. Tech Exit		
Teaching Scheme:	Credits:02	Examination Scheme:
PR: 04 Hrs/Week		Course Activity: 10 Marks
		Term Work: 20 Marks
		Oral Exam: 30 Marks

Complete any one course from the following courses

Offline Skill Based Courses

1. COMPUTER NETWORKS (EAI23301 – A)

Course Objectives:

- The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcome:

On completion of the course, student will be able to

- CO1.** Gain the knowledge of the basic computer network technology.
- CO2.** Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- CO3.** Obtain the skills of subnetting and routing mechanisms.
- CO4.** Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

SYLLABUS

UNIT – I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless Transmission. Data link layer: Design issues, framing, Error detection and correction.

UNIT - II

Elementary data link protocols: simplex protocol, a simplex stop and wait protocol for an error-free channel, a simplex stop and wait protocol for noisy channels. Sliding Window

protocols: A one-bit sliding window protocol, Medium Access sublayer: The channel allocation problem. Wireless LANs, Data link layer switching.

UNIT – III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, the Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Implement Dijkstra's algorithm to compute the shortest path through a network.
3. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
4. Implement distance vector routing algorithm for obtaining routing tables at each node.
5. Implement data encryption and data decryption.

Text Book:

T1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI.

T2. Computer Network: A System Approach, Larry Peterson, Princeton University, Bruce Davie, VMWare.

Reference Book:

R1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education

R2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

Online Skill Based Courses

Sr. No .	Course Code	NPTEL Course	Name of Course Coordinator	Coordinating Institute	Duration	No. of Credits
1	EAI23301-B	Natural Language Processing	Prof. Pawan Goyal	IIT Kharagpur	12 Weeks	3
2	EAI23301- C	Deep Learning	Prof. Sudarshan Iyengar, Prof. Sanatan Sukhija	IIT Ropar	12 Weeks	3
3	EAI23301- D	Data Science For Engineers	Prof. Ragunathan Rengasamy, Prof. Shankar arasimhan	IIT Madras	8 Weeks	2

Online Skill Based Courses Links:-

1. EAI23301 – B: - <https://nptel.ac.in/courses/106105158>
2. EAI23301 – C: https://onlinecourses.nptel.ac.in/noc24_cs59/preview
3. EAI23301 – D: - https://onlinecourses.nptel.ac.in/noc20_cs72/preview

EAI23302 Mini Project – T.Y. B. Tech Exit		
Teaching Scheme:	Credits:02	Examination Scheme:
PR: 04 Hrs/Week		Course Activity: 10 Marks
		Term Work: 20 Marks
		Oral Exam: 30 Marks

Course Objectives:

- To plan for various activities of the project and distribute the work amongst team members.
- To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.

Course Outcome:

On completion of the course, student will be able to

CO1. Understand, plan and execute a Mini Project with team.

CO2. Prepare a technical report based on the Mini project.

CO3. Deliver technical seminar based on the Mini Project work carried out.

Execution of Mini Project

- Project designs ideas can be necessarily adapted from recent issues
- Use of Hardware devices/components/materials is mandatory.
- Assembly of components and enclosure design is mandatory

Selection: Domains for projects may be from the following, but not limited to:

- Blockchain Technology
- Data Science & Data Analytics
- Quantum Computing
- AI and ML
- Deep Learning
- Natural Language Processing

Topics for the project work: Any modern/novel/advanced techniques related with Artificial Intelligence and Data Science Engineering field.

Report writing: A project report with following contents shall be prepared:

- Title
- Introduction
- Scope of the work
- Problem Statement
- Selection of algorithms, calculations
- Testing/Modelling Procedures
- Results & Discussions
- Conclusions
- References

Sample mini-projects:

1. Implement any one of the following Expert System
 - Information management
 - Hospitals and medical facilities
 - Help desks management
 - Employee performance evaluation
 - Stock market trading
 - Airline scheduling and cargo schedules
2. Develop an elementary chatbot for any suitable customer interaction application.
3. Implement CNN object detection on any data. Discuss numerous performance evaluation metrics for evaluating the object detecting algorithms' performance, Generate outputs as a comparative results of algorithms.
4. Text mining using WEKA tool

EAI23303 Internship – T.Y. B. Tech Exit		
Teaching Scheme:	Credits:04	Examination Scheme:
PR: 25 Hrs/Week		Course Activity: 50 Marks
		Term Work: 50 Marks
		Oral Exam: 30 Marks

Course Objective:

- Expose students to the engineer’s responsibilities and professional ethics from social, economic and administrative view.
- Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
- Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes:

On completion of the internship, learner will be able to –

CO1. To develop professional competence through internship.

CO2. To apply academic knowledge in a personal and professional environment

CO3. To build the professional network and expose students to future employees.

CO4. Apply professional and societal ethics in their day-to-day life.

CO5. To become a responsible professional having social, economic and administrative considerations.

CO6. To make own career goals and personal aspirations.

Guidelines to the students:

Any absenteeism by students during their internship should be informed immediately to the mentor/reporting manager and the HOD. No special considerations will be accepted. Student cannot take leave for activities. The monthly attendance should be duly submitted to the HOD by the student.

Internship Diary / Internship Workbook:

Student must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The student should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the student along with attendance record and an evaluation sheet duly signed and stamped by the industry to

the Institute immediately after the completion of the training. Internship Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded.
- Thought process and recording techniques used.
- Organization of the information.

Internship Report:

The report shall be presented covering following recommended fields but limited to:

- Title/Cover Page
- Internship completion certificate.
- Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.
- Index/Table of Contents
- Introduction
- Title/Problem statement/objectives
- Motivation/Scope and rationale of the study
- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)