	ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Model Syllabus for Introduction to Artificial Intelligence in consonance with Curriculum framework w.e.f. AY 2025-26

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	**I**	**1**	AI Fundamentals	**4**	**4**
			AI Fundamentals-Practice Session	**2**	**0**

SEMESTER-I

COURSE 1: AI FUNDAMENTALS

Theory **Credits: 4** **4 hrs/week**

Learning Objectives:

1. Understand the history and evolution of Artificial Intelligence and Identify major subfields of AI.
2. Investigate the role of AI in various industries like healthcare, agriculture, and education.
3. Examine concepts like bias, fairness, transparency, and accountability in AI systems.
4. Explore the integration of AI in scientific research and discuss future directions and evolving trends in AI.
5. Learn how prompt engineering is used in various sectors like education and content creation.

Course Outcomes:

Students will be able to

1. Describe the different subfields and their roles in AI applications.
2. Analyze the benefits and limitations of AI in diverse domains.
3. Evaluate AI systems in terms of inclusivity, privacy, and robustness.
4. Describe Generative AI and emerging technologies like ChatGPT.
5. Apply prompt engineering concepts to various real-world use cases.

Unit I. AI and its Subfields

Introduction to Artificial Intelligence, History, Definition, Artificial General Intelligence, Industry Applications of AI, Challenges in AI.

Knowledge Engineering, Machine Learning, Computer Vision, Natural Language Processing, Robotics.

Unit 2. Applications of AI

Healthcare, Finance, Retail, Agriculture, Education, Transportation.

Unit 3. Bias and Fairness in AI Systems

Ethics in AI, Bias and Fairness in AI Systems, Transparency in AI Systems, Accountability, Security, Privacy, Inclusivity, Sustainability, Robustness, Reliability.

Unit 4. AI in Research, Generative AI and prompt engineering

AI in Experimentation and Multi-disciplinary research, Generative AI introduction, ChatGPT, Hugging Face, Gemini and other tools basics, Perplexity, Prompt engineering Definition and its importance, Role of Prompt Engineering in AI/ML Interaction, Emerging trends and Future Directions in AI.

Unit 5. Applications of Prompt engineering

Applications of Prompt Engineering: Education, Business & Commerce, Content Creation: AI for Creative Writing,AI for creative design, writing AI scripts for video, generating slides and slidesGPT usage, Designing thumbnails and channel branding with AI

Text Books:

1. AI for Everyone: A Beginner's Handbook for Artificial Intelligence (AI) by Saptarsi Goswami, Amit Kumar Das , Amlan Chakrabarti
2. Prompt Engineering for Beginners: by Kapila Arora, Geetu Garg, Gaurav Arora.

References:

1. Let's Learn Artificial Intelligence: Base Module, Niti Ayog, Atal Innovation Mission.
2. Prompt Engineering for Generative AI: Future-proof inputs for Reliable AI-outputs by James Phoenix & Mike Taylor.
3. Generative AI Tutorial:https://www.w3schools.com/gen_ai/
4. Generative AI 360°: Practical Guide to ChatGPT, Midjourney & AI Tools to Boost Productivity & Creativity , For Professionals, Marketers & Entrepreneurs by Hitesh Motwani , ZebraLearn, 2025.
5. Generative AI: Prompt Engineering Basics:
6. Learn Generative AI Prompt Engineering for everyone. https://www.coursera.org/learn/generative-ai-prompt-engineering-for-everyone?action=enroll
7. Free Artificial Intelligence (AI) Tutorial - Hands-On Prompt Engineering for AI Beginners & Business User | Udemy, https://www.udemy.com/course/prompt-engineering-for-ai-beginners-business-users

SEMESTER-I

COURSE 1: AI FUNDAMENTALS

Practice Session **2 hrs/week**

1. Create a mind map of AI subfields: NLP, CV, ML, Robotics, Knowledge Engineering using Canva/Napkin AI/ Similar Open AI tool
2. Text Analysis with Open-Source NLP Tools: **Tool:** Voyant Tools (text analysis web app)
   - Input sample texts (e.g., news articles, speeches).
   - Explore word frequency, keywords, sentiment.
   - Understand how NLP extracts meaning from text.
3. Train a basic image classifier using webcam images. Observe how the model "learns." Using Google Teachable Machine
   - Train two image categories (e.g., “Smiling” vs. “Not Smiling”) using their own webcam images.
   - Observe how the model learns to classify.
   - Now try feeding images of people with different skin tones, facial features, etc.
   - Observe misclassifications or differences in confidence.
4. Simulate an AI chatbot helping a farmer or a student. You may use any GenAI tool of your choice. You may use the prompt below and also try your own.

Prompt:

“Act as an agriculture assistant. A farmer wants to know the best crop based on soil and season. Ask questions and suggest crops.”

5. Test Generative AI- Generate a poem or image from prompt “A futuristic green city.” using ChatGPT, Hugging Face (e.g., image or text generation)

6. Observe how generative AI models may show biased results when prompted with neutral profession descriptions. (Bing Image Creator / DALL·E on ChatGPT/ChatGPT). Generate images using the following neutral prompts:
   - “A doctor treating a patient”
   - “A teacher in a classroom”
   - “A CEO giving a speech”
   - “A software engineer working from home”

   Observe and discuss:
   - What gender/race/age are most commonly shown?
   - Are the results stereotypical or diverse?

7. Check how language models may express bias depending on names, ethnicity, or location.

   Use ChatGPT or Gemini

   Prompts:

   Prompt A:

   "A person named Raj is applying for a bank loan. Will he be approved?"

   Prompt B:

   "A person named John is applying for a bank loan. Will he be approved?"

   Change names, genders, and nationalities.

   Observe the following and report your findings:

   - Are the responses different?
   - Is one version more positive or negative?
   - Does the model express bias or hesitate?
   - Should AI make such predictions?
   - How do developers prevent this?

8. Exploring Text Generation and Summarization with Google AI Studio

Generate Creative Content

"Write a short story (150 words) about a robot who wants to become a chef."

- Submit and read the AI-generated story.
- Discuss how detailed and creative the output is.

Summarize a Paragraph

Prompt:

Summarize the following paragraph in 3 sentences:

"Artificial Intelligence is a branch of computer science that aims to create intelligent machines that can mimic human thinking. It includes various subfields like machine learning, natural language processing, and robotics. AI is widely used in industries such as healthcare, finance, and transportation to improve efficiency and decision-making."

- Submit and review the summary.
- Evaluate how well AI extracts key points.

Refine Your Prompt

Try changing the summary prompt to:

"Summarize the paragraph above in simple language for 10-year-olds."

- Compare this output to the previous one.
- Note how prompt wording changes results.

9. AI for Creative Writing

   Prompt:
   "Write a short motivational story for 10-year-old students in under 150 words."

10. Generate **Slides:** Tool: SlidesGPT/Other Free AI tool

    Prompt:
    "Create a 5-slide presentation on 'AI in Smart Farming'."

11. YouTube Thumbnails / Branding: Tool: Canva + Magic Media AI

    Design a thumbnail using Canva's AI tools with a prompt like:

    "Design a YouTube thumbnail for a video titled 'Top 5 AI Tools for Students'."

	ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Model Syllabus for Applications of Artificial Intelligence in consonance with Curriculum framework w.e.f. AY 2025-26

1. **Applicable to Botany, Zoology, Bio-Technology, Miro-Biology and other Life Sciences**
2. **Applicable to Commerce and Management**
3. **Applicable to History, Economics, Political Science, Linguistics, and any other Humanities**
4. **Applicable to Mathematics, Physics, Chemistry and any other Mathematical Sciences**
5. **Applicable to Computer Science, Data Science, Artificial Intelligence, Cognitive Systems, Data Analytics, Cloud Computing, Cyber Security and any other Computer Science Allied Streams**

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	II	1	Applications of Artificial Intelligence	3	3
			Applications of Artificial Intelligence-Practical	2	1

1. **APPLICABLE TO BOTANY, ZOOLOGY, BIO-TECHNOLOGY, MIRO-BIOLOGY AND OTHER LIFE SCIENCES**

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Theory **Credits: 3** **3 hrs/week**

Course Objectives

1. Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to biological sciences.
2. Familiarize students with different types of datasets and public repositories used in AI research.
3. Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
4. Explore real-world applications of AI in agriculture, ecology, zoology, and environmental sciences.
5. Introduce AI-driven approaches in biotechnology and chemistry, such as genome sequencing, protein structure prediction, and drug discovery.

Course Outcomes

On successful completion of this course, students will be able to:

1. Explain the role of AI hardware, edge devices, and cloud platforms in enabling applications in biological sciences.
2. Differentiate data types and utilize public datasets relevant to AI in life sciences.
3. Design and implement a conceptual AI data pipeline for solving biological problems.
4. Apply AI techniques in case studies of agriculture, zoology, ecology, and environmental monitoring.
5. Analyze the impact of AI in biotechnology and chemistry, particularly in genome sequencing, protein prediction, and drug discovery.

Unit 1. Infrastructure and Platforms for Building Applications using AI

Hardware used in building AI applications: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD

Platforms for building applications using AI: Online platforms (Example - Google AutoML, H2O.ai, Teachable Machine or similar platforms - for practice only); Desktop (No-code/Low-code) platforms (Orange Data Mining, KNIME, Weka, RapidMiner or similar tools - for practice only).

Edge AI: Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances

Unit 2: Foundations of Data - Types, Ethics and Utility in Building Applications using AI

Importance of data in building AI applications: Data as the fuel for AI, Role of big data in training AI models.

Conceptual Foundations of Data: Data vs. Information vs. Knowledge.

Structure of Data: Structured, Semi-Structured, and Unstructured Data.

Modalities of Data: Text, Image, Audio, Video, Tabular, Time-Series, and Spatial Data.

Formats of Data: Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI).

Data Repositories: Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Hugging Face Datasets, UCI Machine Learning Repository, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights.

Ethics, Privacy in Data Usage: Privacy concerns related to data usage; Regulations governing data usage - GDPR, HIPAA (Overview), Ethical use of data, Responsible AI data practices.

Unit 3. The AI Data Pipeline: From Collection to Model Readiness

The AI Data Pipeline: Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models

Core Components: Ingestion, Storage, Processing, Validation, Delivery

Data Collection Methods for AI: Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms)

Data Annotation and Labelling: Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; Types of Annotation: Classification, Bounding Boxes, Segmentation, Transcription, Named Entity Recognition (NER).

Data Cleaning and Preprocessing: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data.

Data Splitting: Splitting data into training set and test set.

Data Transformation Techniques: Normalization, Transformation, Feature Engineering (Conceptual)

Unit 4: AI in Biological Sciences

AI in Botany & Agriculture: Plant disease detection via image recognition; Crop yield forecasting using climate and soil analytics; Precision agriculture: smart irrigation and fertilizer planning

AI in Zoology, Ecology & Environmental Sciences: Wildlife monitoring: species ID from camera trap data; Aquatic systems: fish recognition and water quality modeling; Livestock health and disease prediction; Environmental tracking: forest cover and pollution analysis

Unit 5: AI in BioTechnology and Bio-Chemistry

Application of AI in Genome sequencing & gene function prediction; Using AI in Protein structure modeling (e.g., AlphaFold); AI for Drug discovery: virtual compound screening; Application of AI in Microbial classification & metagenomic profiling; Chemical reaction and material property prediction

1. **APPLICABLE TO BOTANY, ZOOLOGY, BIO-TECHNOLOGY, MIRO-BIOLOGY AND OTHER LIFE SCIENCES**

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Practical **Credits: 1** **2 hrs/week**

Suggested Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- **Procedure**:
    1. Open Orange → Add *File* widget → Load a CSV (e.g., Titanic dataset).
    2. Connect to *Data Table* → View rows/columns.
    3. Connect to *Data Info* → Check attributes, data types.
    4. View in *Data Table* and *Distributions* widget.
- **Observation**: Note numeric, categorical, missing values.
- **Outcome:** Students understand structured data format in CSV.

Lab 2 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 3 - Data Annotation Exercise

- Use **MakeSense.ai** or **VGG Image Annotator (VIA)**
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 4 - Data Cleaning and Visualization (Orange Data Mining)

- **Aim**: To clean dirty data and visualize categorical and numeric attributes.
- **Procedure**:
    1. Load dataset.
    2. Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
    3. Compare cleaned vs. original in *Data Table*.
    4. *Distributions* widget.
    5. Check various features distribution.

  (Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)
- **Observation**: Missing values filled with mean/median., Graphical representation of data.
- **Outcome:** Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 5: Train/Test Split in Orange

- **Aim**: To split a dataset for AI training/testing.
- **Procedure**:
    1. Load Titanic dataset.
    2. Connect *File* → *Data Sampler* (70% train, 30% test).
    3. Connect outputs to *Data Table* widgets to view.
- **Observation**: Students see two different subsets.
- **Outcome:** Concept of model validation using split data.

Lab 6: Plant Leaf Disease Detection

- **Dataset:** Plant leaf disease datasets (PlantVillage, Kaggle).
- **Tool:** Google Teachable Machine / Plantix app.
- Activity: Upload leaf images to classify healthy vs diseased leaves.

Lab 7: Crop Yield Prediction

- **Dataset:** FAO crop yield datasets.
- **Tool:** Orange Data Mining (drag-and-drop AI workflows).
- Activity: Predict yield for different crops based on soil & climate features.

Lab 8: Species Recognization

- **Dataset:** Camera trap image datasets (Snapshot Serengeti, LILA BC).
- **Tool:** iNaturalist / Wildbook AI platform.
- Activity: Upload wildlife images for species recognition & conservation mapping.

Lab 9: Predict and visualize 3D protein structures:

- **Dataset:** Genomic & protein sequence databases (NCBI, UniProt, AlphaFold DB).
- **Tool:** AlphaFold Protein Structure Viewer (online).
- Activity: Predict and visualize 3D protein structures.

Lab 10: Analyze chemical similarity and predict drug-likeness.

- **Dataset:** Drug compound datasets (ChEMBL).
- **Tool:** ChemMine Tools (web-based).
- Activity: Analyze chemical similarity and predict drug-likeness.

Lab 11: Identify microbial species from sequencing datasets.

- **Dataset:** Metagenomics datasets (MG-RAST).
- **Tool:** MG-RAST online platform.
- Activity: Identify microbial species from sequencing datasets.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

Books/References

1. **Data Science for Beginners**, Andrew Park
   (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2. **AI Basics for Non-Programmers**, Tom Taulli
   (Clear explanations of AI data lifecycle and real-world use cases)
3. **Data Preparation for Machine Learning**, Jason Brownlee
   (Conceptual understanding of dataset quality, preprocessing, and pipelines)
4. **Hands-On Data Science for Non-Programmers**, David Meerman Scott
   (Spreadsheet-based data exploration and visualization)
5. You Look Like a Thing and I Love You – Janelle Shane

6. **Artificial Intelligence in Life Sciences** – Elsevier.
7. **Artificial Intelligence in Agriculture** – CRC Press (B. Prasad).
8. **AI for Ecology and Conservation** – Springer.
9. **Bioinformatics and Drug Discovery using AI** – Academic Press.
10. Databases & Platforms: FAO, GBIF, PlantVillage, ChEMBL, UniProt, AlphaFold DB.

Online Resources

- **Kaggle Dataset Search**, https://www.kaggle.com/datasets
- **Google Dataset Search**, https://datasetsearch.research.google.com
- **UCI Machine Learning Repository**, https://archive.ics.uci.edu
- **Hugging Face Datasets**, https://huggingface.co/datasets
- **Open Government Data (India)**, https://data.gov.in

2. APPLICABLE TO COMMERCE AND MANAGEMENT

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

1. Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to commerce and management.
2. Familiarize students with different types of datasets and public repositories used in AI research.
3. Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
4. Understand how AI enhances retail and e-commerce and explore personalization, recommendation systems, and customer engagement
5. Apply AI to streamline business processes and decision-making and explore AI in finance, HR, and supply chain management

Course Outcomes:

On successful completion of this course, students will be able to:

1. Explain the AI ecosystem (hardware, cloud, and edge devices) and its relevance to commerce and management.
2. Differentiate between structured and unstructured data, and utilize public datasets for business-oriented AI applications.
3. Design a conceptual AI data pipeline for solving real-world problems in commerce and management.
4. Understand and apply AI technologies to improve customer engagement and personalization in commerce.
5. Use AI tools to streamline business operations, enhance decision-making, and detect patterns in data.

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Hardware used in building AI applications: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD

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Data Splitting: Splitting data into training set and test set.

Data Transformation Techniques: Normalization, Transformation, Feature Engineering (Conceptual)

Unit 4: AI in Commerce – Transforming the Consumer Experience

Introduction to AI in Commerce, Recommendation Engines (Collaborative & Content-Based), Chatbots and Virtual Assistants, Sentiment Analysis and Review Mining, Inventory Optimization and Demand Forecasting, Ethical Issues related to use of AI in Commerce and Business: Bias, Privacy, and Transparency

Unit 5: AI in Business Operations – Driving Efficiency and Insight

AI in Business Intelligence and Predictive Analytics, Financial Applications: Fraud Detection, Risk Modelling, HR Applications: Resume Screening, Employee Analytics, Supply Chain Automation and Optimization, AI in Marketing: Customer Segmentation, Lead Scoring, Strategic Adoption of AI in Enterprises, Explainable AI in E-Commerce.

2. APPLICABLE TO COMMERCE AND MANAGEMENT

SEMESTER-II

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Suggested Lab Practicals (No Coding)

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- **Observation**: Students see two different subsets.
- **Outcome:** Concept of model validation using split data.

Lab 6: Introduction to AI in Commerce – Use Case Exploration

Prerequisite: Discuss conceptually about Clustering

Objective: Understand how AI is applied in commerce through data visualization and clustering.

Orange Workflow: Use Orange Data Mining Tool

Widgets Used: File → Data Table → Scatter Plot → Hierarchical Clustering

Dataset: Retail customer data (e.g., purchase frequency, amount spent)

Dataset Link: Retail Sales Data

Activities:

- Load customer data and visualize spending patterns.
- Apply clustering to identify customer segments.
- Discuss how businesses can tailor services to each segment.

Outcome: Students grasp how AI helps businesses understand and target consumers more effectively.

Lab 7: Recommendation Engine Simulation

Prerequisite: Discuss conceptually about Clustering

Objective: Simulate collaborative filtering using similarity-based clustering.

Orange Workflow:

Widgets Used: File → Distance → Hierarchical Clustering → Data Table

Dataset: User-product ratings matrix

Dataset Link: Amazon Product Recommendation System

Activities:

- Calculate similarity between users.
- Group similar users and recommend products based on cluster behavior.
- Discuss differences between collaborative and content-based filtering.

Outcome: Students understand the logic behind recommendation systems and how they personalize user experience.

Lab 8: Chatbot Intent Classification

Prerequisite: Discuss conceptually about Linear Regression & Logistic Regression

Objective: Train a model to classify customer queries into intents.

Orange Workflow:

Widgets Used: File → Preprocess Text → Bag of Words → Logistic Regression → Test & Score

Dataset: Sample customer queries labeled with intents (e.g., “track order”, “return item”)

Dataset Link: Customer Intent Classification

Activities:

- Preprocess and vectorize text data.
- Train a classifier to predict query intent.

- Evaluate accuracy and discuss chatbot training.

Outcome: Students learn how AI understands and responds to customer queries.

Lab 9: Sentiment Analysis of Reviews

Prerequisite: Discuss conceptually about Naive Bayes

Objective: Classify customer reviews as positive or negative.

Orange Workflow:

Widgets Used: File → Preprocess Text → Bag of Words → Naive Bayes → Test & Score

Dataset: Product reviews with sentiment labels

Dataset Link: Amazon Product Reviews – Sentiment Analysis

Activities:

- Clean and tokenize review text.
- Train a sentiment classifier.
- Visualize word clouds for positive vs. negative reviews.

Outcome: Students analyze customer feedback and extract actionable insights.

Lab 10: Demand Forecasting with Regression

Prerequisite: Discuss conceptually about Linear Regression & Logistic Regression

Objective: Predict future sales using regression models.

Orange Workflow:

Widgets Used: File → Linear Regression → Scatter Plot → Test & Score

Dataset: Historical sales data (e.g., monthly sales, promotions)

Dataset Link: Comprehensive Retail Sales Data

Activities:

- Train a regression model to forecast sales.
- Visualize predictions vs. actuals.
- Discuss implications for inventory planning.

Outcome: Students understand how AI supports demand forecasting and inventory control.

Lab 11: Bias Detection in AI Models

Prerequisite: Discuss conceptually about Linear Regression, Logistic Regression & Confusion Matrix

Objective: Explore bias in predictive models and its impact.

Orange Workflow:

Widgets Used: File → Logistic Regression → Confusion Matrix → Distributions

Dataset: HR hiring data with gender or age attributes

Dataset Link: HR Data Analytics

Activities:

- Train a model to predict hiring decisions.
- Analyze performance across demographic groups.
- Discuss fairness, transparency, and ethical implications.

Outcome: Students critically assess bias and propose ethical safeguards.

Lab 12: Predictive Analytics for Business Intelligence

Prerequisite: Discuss conceptually about Random Forest

Objective: Use classification to predict customer churn.

Orange Workflow:

Widgets Used: File → Random Forest → Test & Score → ROC Analysis

Dataset: Telecom or subscription data with churn labels

Dataset Link: Telco Customer Churn – IBM Dataset

Activities:

- Train and evaluate a churn prediction model.
- Interpret ROC curves and accuracy.
- Discuss how businesses can act on predictions.

Outcome: Students apply predictive analytics to improve customer retention.

Lab 13: AI in HR and Marketing – Resume Screening & Segmentation

Prerequisite: Discuss conceptually about Clustering

Objective: Classify resumes and segment customers using clustering.

Orange Workflow:

HR Task: File → Preprocess Text → Bag of Words → Logistic Regression

Marketing Task: File → k-Means Clustering → Scatter Plot

Resume Screening Dataset: Employee Hiring Data

Customer Segmentation Dataset: Customer Segmentation Dataset

Activities:

- Screen resumes based on job fit.
- Segment customers by behavior or demographics.
- Discuss automation benefits and risks.

Outcome: Students explore how AI enhances HR and marketing efficiency.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

Books/References

1. **Data Science for Beginners**, Andrew Park
   (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2. **AI Basics for Non-Programmers**, Tom Taulli
   (Clear explanations of AI data lifecycle and real-world use cases)
3. **Data Preparation for Machine Learning**, Jason Brownlee
   (Conceptual understanding of dataset quality, preprocessing, and pipelines)
4. **Hands-On Data Science for Non-Programmers**, David Meerman Scott
   (Spreadsheet-based data exploration and visualization)
5. You Look Like a Thing and I Love You – Janelle Shane

3. APPLICABLE TO HISTORY, ECONOMICS, POLITICAL SCIENCE, LINGUISTICS, AND ANY OTHER HUMANITIES

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Theory **Credits: 3** **3 hrs/week**

Course Objectives

1. Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms, in a non-technical way for Arts and Social Sciences students.
2. Familiarize students with data types, sources, and public repositories that fuel AI applications in society and humanities.
3. Explain the process of preparing and managing AI data pipelines through collection, annotation, and cleaning.
4. Explore real-world applications of AI in arts, culture, literature, linguistics, and languages.
5. Introduce applications of AI in social sciences such as economics, political science, psychology, history, and sociology, with an emphasis on ethics and responsible adoption.

Course Outcomes

On successful completion of this course, students will be able to:

1. Explain the AI ecosystem (hardware, cloud, edge devices) and its societal relevance.
2. Differentiate data types and identify public datasets relevant to social sciences, arts, and humanities.
3. Describe the steps of an AI data pipeline (collection, annotation, cleaning, preparation) in simple terms.
4. Illustrate the role of AI in arts, languages, and cultural heritage with practical, real-world examples.
5. Analyze applications of AI in social sciences (economics, politics, psychology, history, and society) and evaluate ethical concerns.

Unit 1. Infrastructure and Platforms for Building Applications using AI

Hardware used in building AI applications: Processors - CPU, GPU, TPU, NPU, Memory - RAM, VRAM, Storage - HDD, SSD

Platforms for building applications using AI: Online platforms (Example - Google AutoML, H2O.ai, Teachable Machine or similar platforms - for practice only); Desktop (No-code/Low-code) platforms (Orange Data Mining, KNIME, Weka, RapidMiner or similar tools - for practice only).

Edge AI: Concept; Applications in daily life in devices like Refrigerators, Led Bulbs, Surveillance Cameras, Micro Ovens, Smart Cars/Scooters; Edge AI in smart Appliances

Unit 2: Foundations of Data - Types, Ethics and Utility in Building Applications using AI

Importance of data in building AI applications: Data as the fuel for AI, Role of big data in training AI models.

Conceptual Foundations of Data: Data vs. Information vs. Knowledge.

Structure of Data: Structured, Semi-Structured, and Unstructured Data.

Modalities of Data: Text, Image, Audio, Video, Tabular, Time-Series, and Spatial Data.

Formats of Data: Text Formats (CSV, JSON, XML), Image Formats (JPEG, GIF, PNG), Audio/Video (MP3, WAV, MP4, AVI).

Data Repositories: Definition of public Datasets; Definition of private Datasets; Importance of Public Datasets, Popular Public Dataset Repositories (Example - Kaggle, Hugging Face Datasets, UCI Machine Learning Repository, Google Dataset Search or similar ones - for demonstration only), Dataset licensing and usage rights.

Ethics, Privacy in Data Usage: Privacy concerns related to data usage; Regulations governing data usage - GDPR, HIPAA (Overview), Ethical use of data, Responsible AI data practices.

Unit 3. The AI Data Pipeline: From Collection to Model Readiness

The AI Data Pipeline: Stages and Components: Key Stages (Data Collection, Annotation, Preprocessing, Splitting, Feeding into AI Models

Core Components: Ingestion, Storage, Processing, Validation, Delivery

Data Collection Methods for AI: Manual Input (Surveys, forms, human-curated entries), Sensors & IoT Devices (Real-time data from physical environments), System Logs & Transactions, Web Scraping (Automated extraction from websites), APIs (Structured data access from external platforms)

Data Annotation and Labelling: Definition & Importance; Annotation Methods: Manual Annotation, Automated Annotation; Types of Annotation: Classification, Bounding Boxes, Segmentation, Transcription, Named Entity Recognition (NER)

Data Cleaning and Preprocessing: Importance of data cleaning; Understanding "Dirty" Data: Missing Values, Duplicates, Incorrect Formats, Outliers, Noise; Steps in Data Cleaning: Identify Issues, Handle Errors (Imputation, Removal), Validate Cleaned Data

Data Splitting: Splitting data into training set and test set.

Data Transformation Techniques: Normalization, Transformation, Feature Engineering (Conceptual)

Unit 4: AI in Social Sciences and Society:

AI in Economics: Predicting market trends, consumer behavior, and economic forecasting.

AI in Political Science & Public Policy: Social media analysis for political campaigns, Opinion mining & election trend prediction.

AI in Psychology & Sociology: Emotion recognition from facial expressions and text, AI chatbots in mental health counseling (conceptual).

AI in History & Society: Digital archives and historical document analysis,AI for preserving ancient languages and scripts, Social impact of AI on jobs, privacy, and democracy.

Unit 5: AI in Arts, Languages, and Cultural Studies

AI in Literature & Languages: Machine translation (Google Translate, DeepL), Sentiment analysis in literature and media reviews, AI-assisted creative writing (chatbots, story generators, poetry)

AI in Arts & Culture: AI in music composition & art generation (painting, film scripts), Digitization and preservation of cultural heritage using AI, Identifying fake art and forgeries

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SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Practical **Credits: 1** **2 hrs/week**

Lab Experiments:

Lab 1: Explore Open Data (Economics / Sociology)

- **Tool**: Our World in Data or World Bank Data Explorer (https://data360.worldbank.org/en/search)
- **Task**: Choose indicators (e.g., Literacy, GDP per capita, Poverty, Unemployment).
- **Procedure**:
    1. Open World Bank / Our World in Data.
    2. Select one country or compare multiple countries.
    3. Use the interactive charts to see historical trends.
- **Observation**: How does education level impact income or health?
- **Outcome:** Understand correlations between **socio-economic indicators**.

Lab 2: Data Annotation (NER & Classification)

- **Tool**: Prodigy Demo (https://demo.prodi.gy/) -free online demo, no install
- **Activity**:
    1. Try Named Entity Recognition (NER) demo.
    2. Highlight organizations, people, and places in sample text.
    3. Compare manual vs. automated annotation.
- **Outcome**: Students understand **manual vs. automated annotation** and why labeling is crucial.

Lab 3: Automatic Text Classification for Sociology

- **Tool:** Text2Data Sentiment Analysis Demo (https://text2data.com/Demo) *-free online demo*
- **Task:** Copy-paste 5 messages related to climate change, caste or gender.

- **Observation:** Tool classifies them as Positive, Neutral, or Negative.
- **Outcome:** Understand "annotation" and "classification labels."

Lab 4: Word Clouds for Political Speeches (Languages / Political Science)

- **Tool:** WordArt Cloud Generator (https://wordart.com/create) - Free Online
- **Procedure:**
    1. Copy a Prime Minister's speech or Economic Budget highlights.
    2. Paste into WordArt.
    3. Generate a word cloud → biggest words = most repeated.
- **Observation:** Main themes in political communication.
- **Outcome:** Learn how text visualization shows political/economic priorities.

Lab 5: Bias in Job Advertisements (Sociology / Gender Studies)

- **Tool:** Gender Decoder for Job Ads (https://gender-decoder.katmatfield.com/) -Free Online or Any other related tool
- **Procedure:**
    1. Copy text from 5 job advertisements.
    2. Paste into the gender bias detector.
    3. Note masculine vs feminine coded words.
- **Observation:** How language influences gendered hiring.
- **Outcome:** Awareness of AI in analyzing workplace bias.

Lab 6: Language Detection & Translation (Languages / Linguistics)

- **Tool**: Google Translate (https://translate.google.co.in/)
- **Task**: Enter text in regional/foreign languages.
- **Procedure**:
    1. Paste short paragraph in Telugu, Hindi, French, etc.
    2. Translate into English.
    3. Reverse-translate to see changes.
- **Observation**: Which meanings are lost in translation?
- **Outcome**: Students understand **AI's strengths/limits in translation**.

Lab 7: Text Summarization of Articles (Languages / Literature)

- **Tool**: SMMRY (https://smmry.com/) or
  Scholarcy Free Summarizer (https://www.scholarcy.com/article-summarizer)
- **Task**: Take a long article or essay.
- **Procedure**:
  1. Paste article into tool.
  2. Generate summary.
  3. Compare AI summary vs. student's manual summary.
- **Observation**: AI captures main ideas but may miss nuances.
- **Outcome**: Learn how **AI helps in academic reading & summarization**.

Lab 8: Talk to a Free Chatbot

- **Tool:** ChatGPT Free or Poe or any other related tool
- **Activity:** Students ask questions like:
  - "Tell me a Telugu proverb and its meaning."
  - "Explain World War II in 5 simple lines."
- **Outcome: Data delivery/output** stage - AI as a dialogue system.

Lab 9: Story Generator (Creative Writing / Literature)

- **Tool:** AI Dungeon (https://play.aidungeon.com/) -free play or DeepAI Text Generator (https://deepai.org/chat/text-generator)
- **Activity:** Give a starting line (e.g., "Once upon a time in Amaravati…") → AI continues story
- **Outcome:** How **training data influences creativity** in AI.

Lab 10: AI Art Generator (Culture & Arts)

- **Tool:** DeepAI Text-to-Image *(free) (https://deepai.org/machine-learning-model/text2img) or any other related tool*
- **Activity:** Ask students to generate:
  - "A painting of Bharat Mata in Picasso style."
  - "Hyderabad Charminar in futuristic design."
- **Outcome:** Data pipeline applied to **images**.

Lab 11: AI Music Generation with Soundraw (Free Trial)

Tool: Soundraw.io

Steps:

Open the website → Click **Create Music**.

Select **Mood** (happy, sad, chill, dramatic).

Select **Genre** (pop, jazz, cinematic, lo-fi, etc.).

The AI will generate a full instrumental track.

You can adjust instruments, tempo, and structure.

Outcome: Students understand how AI composes music automatically based on mood/genre → linking to **psychology, culture, and media studies**.

Lab 12: Chatbot Roleplay (History / Social Science)

- **Tool:** Character.AI *(free, no coding)*- *https://character.ai/*
- **Activity:** Talk to AI characters like "Einstein" or "Shakespeare" and ask them questions. You can try with other AI characters and experiment.
- **Learning:** How AI **mimics personalities** using training data.

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SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Theory **Credits: 3** **3 hrs/week**

Course Objectives

1. Provide a foundational understanding of AI platforms, data pipelines, and their importance in the physical sciences.
2. Introduce real-world datasets and public repositories relevant to physics, chemistry, mathematics, and earth sciences.
3. Explain how AI is applied to solve scientific problems, discover patterns, and support research in physical sciences in a simple, non-coding manner.
4. Highlight ethical concerns, data challenges, and the future of AI-driven discoveries in physical sciences.

Course Outcomes

On successful completion of this course, students will be able to:

1. Explain the AI ecosystem (hardware, cloud, and edge devices) in relation to physical sciences applications.
2. Identify scientific data types and public repositories relevant to physics, chemistry, mathematics, and earth sciences.
3. Describe the process of preparing and managing scientific data pipelines.
4. Illustrate the role of AI in solving real-world scientific challenges in physics, chemistry, mathematics, and earth sciences.
5. Analyze ethical, environmental, and societal impacts of AI-driven scientific applications.

Unit 1. Infrastructure and Platforms for Building Applications using AI

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Unit 4: AI in Physical Sciences (Physics & Chemistry Applications)

AI in Physics: AI for analyzing astronomical images (identifying galaxies, stars, exoplanets), CERN Datasets for Particle Physics.

AI in material science: discovering new superconductors and quantum materials

AI in energy: predicting power grid loads, optimizing solar and wind energy systems

AI in Chemistry:

Protein structure prediction (AlphaFold).

AI in drug discovery - virtual screening of compounds.

AI in chemistry - reaction outcome & material property prediction**.**

Unit 5: AI in Mathematics and Earth Sciences

AI in Mathematics:

Pattern recognition in large datasets (fractals, chaos systems, number theory)

Automated theorem proving and symbolic mathematics

AI in optimization problems (transport, logistics, resource allocation)

(Explore the Wolfram Alpha Tool: https://www.wolframalpha.com/examples/mathematics)

AI in Earth Sciences

Climate modeling: AI predicting weather patterns, cyclones, and long-term climate change

Remote sensing: AI analyzing satellite images for deforestation, urbanization, and natural resource mapping

Earthquake and natural disaster prediction using sensor networks

AI in geology: identifying mineral deposits, oil, and groundwater reserves

APPLICABLE TO MATHEMATICS, PHYSICS, CHEMISTRY AND ANY OTHER MATHEMATICAL SCIENCES

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Practicxal **Credits: 1** **2 hrs/week**

Suggested Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- **Procedure**:
    1. Open Orange → Add *File* widget → Load a CSV (e.g., Titanic dataset).
    2. Connect to *Data Table* → View rows/columns.
    3. Connect to *Data Info* → Check attributes, data types.
    4. View in *Data Table* and *Distributions* widget.
- **Observation**: Note numeric, categorical, missing values.
- **Outcome:** Students understand structured data format in CSV.

Lab 2 - Exploring Scientific Datasets

Dataset: Earth datasets, Physics Particle Dataset

Tool: Orange Data Mining.

Activity:

- Load a CSV (e.g., earthquake dataset:
  https://www.kaggle.com/datasets/warcoder/earthquake-dataset
  Physics particle dataset:
  https://www.kaggle.com/datasets/dsfelix/physics-particles)
- Use **Data Table + Distributions** to view features.
- Compare categorical vs numerical attributes.

Outcome: Students understand how scientific datasets are structured and visualized.

Lab 3 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 4 - Data Annotation Exercise

- Use **MakeSense.ai** or **VGG Image Annotator (VIA)**
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 5 - Data Cleaning and Visualization (Orange Data Mining)

- **Aim**: To clean dirty data and visualize categorical and numeric attributes.
- **Procedure**:
    1. Load dataset.
    2. Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
    3. Compare cleaned vs. original in *Data Table*.
    4. *Distributions* widget.
    5. Check various features distribution.

  (Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)
- **Observation**: Missing values filled with mean/median., Graphical representation of data.
- **Outcome:** Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 6: Train/Test Split in Orange

- **Aim**: To split dataset for AI training/testing.
- **Procedure**:
    1. Load Titanic dataset.
    2. Connect *File* → *Data Sampler* (70% train, 30% test).

3. Connect outputs to *Data Table* widgets to view.

- **Observation**: Students see two different subsets.
- **Outcome:** Concept of model validation using split data.

Lab 7 – Material Science Data Exploration (Chemistry + Physics)

Dataset: Materials Project Database (https://next-gen.materialsproject.org/) OR Kaggle chemistry datasets (https://www.kaggle.com/competitions?tagIds=7402-Chemistry) .

Tool: Orange Data Mining.

Activity:

Load material/compound dataset (e.g., band gap, conductivity).

Visualize trends (scatter plots, bar charts).

Identify correlations between features.

Outcome: Students see how AI identifies new material properties.

Lab 8 – Earthquake Prediction Data Analysis (Earth Sciences)

Dataset: USGS Earthquake Dataset (public):

https://www.kaggle.com/datasets/rupindersinghrana/usgs-earthquakes-2024

Tool: Orange Data Mining

Activity:

- Load earthquake data (time, magnitude, depth).
- Plot frequency over time & regions.
- Perform simple clustering (e.g., k-means in Orange).

Outcome: Understand how AI detects seismic patterns.

Lab 9– Climate Data Visualization (Earth Sciences)

Dataset: NASA GISS climate dataset (https://data.giss.nasa.gov/gistemp/) / FAO rainfall data (https://www.fao.org/aquastat/en/geospatial-information/climate-information) .

Tool: Google Looker Studio (free dashboard tool).

Activity:

- Import CSV of temperature/rainfall data.
- Build trend graphs and heat maps.

Outcome: Learn visualization of climate patterns & anomalies.

Lab 10 – Chemical Compound Classification (Chemistry)

Prerequisite: Discuss conceptually about Clustering

Dataset: PubChem / ChEMBL chemical datasets. (https://pubchem.ncbi.nlm.nih.gov/source/ChEMBL)

Tool: ChemMine Tools (free web-based). (https://chemminetools.ucr.edu/)

Activity:

- Input chemical structures or SMILES notations.
- Predict chemical similarity clusters.
- Analyze "drug-likeness" properties.

Outcome: Understanding AI in drug discovery & reaction prediction.

Lab 11 – Symbolic Mathematics Solver (Mathematics)

Dataset: Wolfram Alpha examples / OpenMath datasets.

Tool: MathPix (OCR) + Symbolab / WolframAlpha (free tier)- https://www.wolframalpha.com/

Activity:

- Input handwritten/scanned math problems using MathPix.
- Use Wolfram Alpha to see symbolic solving.
- Compare AI vs manual solution steps.

Outcome: Understand automated theorem proving and symbolic AI.

Lab 11 – Explore the Mathematical AI tool

Tool: WolframAlpha (free tier)- https://www.wolframalpha.com/

Activity:

- Solve specific math problems or find information on Mathematical subjects and topics.

Outcome: Understand deep computational power of AI tools in solving Math Problems.

Lab 12 – Explore various Remote Sensing Datasets

Tool: https://developers.google.com/earth-engine/datasets/

Activity:

- Explore any Three Satellite Sensor Datasets
- Identify the Significance and the Period of Availability
- Study various bands available in the data

Outcome: Understand various Remote Sensing Datasets.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

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   (Introductory concepts of data types, collection, cleaning, and visualization without coding)
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5. You Look Like a Thing and I Love You – Janelle Shane
6. AI in Astronomy:
   https://www.borntoengineer.com/how-is-artificial-intelligence-is-helping-us-learn-about-the-universe
   https://primo.ai/index.php/Astronomy
7. CERN datasets for Particle Physics: https://opendata.cern.ch/
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13. AI in Remote Sensing:
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SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Theory **Credits: 3** **3 hrs/week**

Course Objectives

1. Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to Computer science.
2. Familiarize students with different types of datasets and public repositories used in AI research.
3. Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
4. Expose students to no-code AI platforms, vibe coding, and workflow automation tools for rapid AI application development.
5. Introduce applications of AI in networking, cybersecurity, and digital forensics, highlighting both opportunities and challenges.

Course Outcomes

On successful completion of this course, students will be able to:

1. Explain the role of AI hardware, edge devices, and cloud platforms in enabling applications in Computer Science.
2. Differentiate data types and utilize public datasets relevant to AI.
3. Design and implement a conceptual AI data pipeline for solving problems.
4. Apply no-code/low-code AI platforms, vibe coding tools, and workflow automation for simple AI-powered applications.

5. Evaluate the role of AI in networking, cybersecurity, and digital forensics, and discuss its challenges and future scope.

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Data Splitting: Splitting data into training set and test set.

Data Transformation Techniques: Normalization, Transformation, Feature Engineering (Conceptual)

Unit 4. AI-Powered No-Code Development: Vibe Coding and Workflow Automation

Vibe Coding: Concept & Workflow: What is Vibe Coding and how it works; Comparison: Vibe Coding vs. traditional programming; Tools Overview: Google AI Studio, Firebase Studio, Replit, Cursor, Windsurf (for demonstration and practice only); Tool Selection: Choosing the right platform for your needs; Benefits & Challenges: Advantages and limitations of Vibe Coding; Paradigm Shift: From code-centric to prompt-driven development; Prompt Crafting: Structure and examples of effective app prompts.

Workflow Automation using AI: Fundamentals: What is workflow automation and its relevance in the AI era; Real-world Applications: Auto-email responses, Feedback summarization, Social media alerts & analytics; Toolset Overview: Zapier, Power Automate, n8n, Lindy and other similar tools (for demonstration and practice only); Choosing the Right Tool: Features, use cases, and integration potential.

Unit 5. AI in Networks, Cybersecurity, and Forensics

AI in Networking: Need of AI in Network Management, How AI works in Traffic Prediction & Intrusion Detection, Uses of AI in Optimization, Fault Management, and Routing

AI in Cyber Security: Need of AI in Cyber Security, How AI works in Cyber Security, Uses of AI in Cyber Security, Challenges and Considerations of AI in Cyber Security

AI in Digital Forensics: How AI enhance digital forensic investigations, Role of AI in cyber-forensic evidence acquisition and analysis, Overcoming challenges and limitations of AI in forensics, The future outlook for AI-powered forensic tools

APPLICABLE TO COMPUTER SCIENCE, DATA SCIENCE, ARTIFICIAL INTELLIGENCE, COGNITIVE SYSTEMS, DATA ANALYTICS, CLOUD COMPUTING, CYBER SECURITY AND ANY OTHER COMPUTER SCIENCE ALLIED STREAMS

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Practical **Credits: 1** **2 hrs/week**

Suggested Lab Practicals (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

- Visit a public repository (Kaggle, UCI, data.gov.in)
- Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
- **Procedure**:
    1. Open Orange → Add *File* widget → Load a CSV (e.g., Titanic dataset).
    2. Connect to *Data Table* → View rows/columns.
    3. Connect to *Data Info* → Check attributes, data types.
    4. View in *Data Table* and *Distributions* widget.
- **Observation**: Note numeric, categorical, missing values.
- **Outcome:** Students understand structured data format in CSV.

Lab 2 – Exploring Cybersecurity Datasets (Orange Data Mining)

- Dataset: Kaggle Cybersecurity dataset. https://www.kaggle.com/datasets/teamincribo/cyber-security-attacks?select=cybersecurity_attacks.csv
- **Procedure**:
    1. Load dataset into Orange (File widget).
    2. View using **Data Table** and **Distributions** widgets.
    3. Identify numerical (packet size, duration) and categorical (protocol type, attack type) attributes.
- **Observation:** Note features that indicate "attack" vs. "normal traffic."
- **Outcome:** Students understand the type of features used in intrusion detection.

Lab 3 - Understanding Dataset Metadata and Formats

- Take two datasets in different formats (CSV, JSON)
- View metadata (description, features, size, license)
- Compare domain-specific datasets (e.g., medical vs. finance)

Lab 4 - Data Annotation Exercise

- Use **MakeSense.ai** or **VGG Image Annotator (VIA)**
- Annotate 10 sample images (traffic signs, fruits, or medical scans)
- Export annotations in XML or YOLO format
- Discuss annotation errors and challenges

Lab 5 - Data Cleaning and Visualization (Orange Data Mining)

- **Aim**: To clean dirty data and visualize categorical and numeric attributes.
- **Procedure**:
    1. Load dataset.
    2. Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
    3. Compare cleaned vs. original in *Data Table*.
    4. *Distributions* widget.
    5. Check various features distribution.

  (Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)
- **Observation**: Missing values filled with mean/median., Graphical representation of data.
- **Outcome:** Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 6: Train/Test Split in Orange

- **Aim**: To split dataset for AI training/testing.
- **Procedure**:
    1. Load Titanic dataset.
    2. Connect *File* → *Data Sampler* (70% train, 30% test).

3. Connect outputs to *Data Table* widgets to view.

- **Observation**: Students see two different subsets.
- **Outcome:** Concept of model validation using split data.

Lab 7 – Writing a Detailed Prompt for a Simple Game App (Generative AI)

- **Objective**: Understand prompt engineering by designing a game idea.
- **Activity**:
  1. Open ChatGPT (or Gemini, Copilot).
  2. Write a detailed prompt like *"Create a simple text-based treasure hunt game with levels, scoring, and random challenges."*
  3. Ask the AI to refine game rules, scoring, and characters.
  4. Document how prompt detail changes the AI's response.
- **Outcome**: Students learn how detailed prompts shape AI outputs.

Lab 8 – Create a Portfolio Website using Vibe Coding Tool

- **Objective**: Learn how AI-assisted coding tools can automatically generate websites from simple instructions.
- **Activity**:
  1. Open **Vibe Coding Tool** (Windsurf/Cursor/Firebase Studio/Any other vibe coding tool).
  2. Give a natural language instruction:
     "Create a personal portfolio website for a Computer Science student. It should have sections: About Me, Education, Skills, Projects, and Contact."
  3. Experiment with different prompts to change **layout, theme, or color scheme** (e.g., *"Make it a modern dark theme with blue highlights."*).
  4. Preview the generated site and customize content.
- **Outcome**: Students experience how **AI converts prompts into functional websites** with minimal coding effort.

Lab 9 – Develop an Interactive Education Quiz App using Vibe Coding Tool

- **Objective**: Understand AI's role in creating **educational applications**.
- **Activity**:
    1. Open **Vibe Coding Tool**.
    2. Give prompt: *"Build an interactive quiz app for students with multiple-choice questions on AI basics. Include features: Start Quiz, Show Score, Retry."*
    3. Refine the app by asking AI to:
        - Add **timer** for each question.
        - Show **correct/incorrect answers** instantly.
        - Add a **Leaderboard** page.
    4. Test the app by playing the quiz.
- **Outcome**: Students see how **AI-generated apps** can support **e-learning and assessments**.

Lab 10-Automating Feedback Summarization using n8n and AI

Objective: Automatically summarize student feedback responses using AI and email the summary to the teacher.

Steps:

1. **Trigger Node:** Google Sheets (watch new row for feedback).
2. **AI Node:** Send text to OpenAI/Gemini API for summarization.
   (Get a free API from **OpenRouter (https://openrouter.ai/)** → Gives free trial credits + access to multiple models.)
3. **Action Node:** Gmail → email summarized feedback to teacher.
4. **Test:** Enter sample feedback in Google Sheet → receive AI summary via email.
5. **Discussion:** How AI reduced manual effort in reading every response.

Outcome: Students see how automation + AI can transform data into insights instantly.

Lab 11 – Using AI Functions in Google Sheets

Objective: Enable students to experience Google Sheets' built-in AI-powered features like summarizing, categorizing, sentiment analysis, and text generation through simple prompts within the spreadsheet environment.

Tools & Setup

Enable Google Sheets with Workspace Labs

https://workspace.google.com/labs-sign-up/u/1/

Follow the References and experiment with summarizing, categorizing, sentiment analysis, and text generation using =AI() function

https://support.google.com/docs/answer/15820999?visit_id=638919819014625788-1742465261&p=ai-function&rd=1

https://support.google.com/docs/answer/13447609?hl=en&sjid=9077695331310534831-NC

https://support.google.com/docs/answer/13635180?hl=en&ref_topic=13450085&sjid=9077695331310534831-NC

Outcome: Students will experience various AI functions within a spreadsheet-text generation, summarization, categorization, sentiment analysis.

Lab 12- Deep Fake Image Detection

Objective

Enable students to critically assess image authenticity using multiple free AI tools, understanding the strengths and limitations of each.

Tools:

Deepfake-O-Meter: https://zinc.cse.buffalo.edu/ubmdfl/deep-o-meter/landing_page

Decopy AI Image Detector: https://decopy.ai/ai-image-detector/

Procedure

1. **Collect Images**
    - 2 real images (e.g., faces from Unsplash or personal photos)
    - 2 AI-generated or manipulated images (e.g., from Midjourney, DALL·E, or Google AI studio)
2. **Run through DeepFake-o-Meter**
    - Visit the platform and upload an image.
    - Note the output: what algorithms flag or overall score for authenticity.
3. **Use Decopy AI Image Detector**
    - Upload the same images.
    - Check results indicating whether the image appears AI-generated.

Observation: How AI tools help in Digital Forensics.

Note: The Tools suggested above are tentative. Teacher/Student is free to choose any other similar tool to execute the said lab experiments.

Books/References

1. **Data Science for Beginners**, Andrew Park
   (Introductory concepts of data types, collection, cleaning, and visualization without coding)
2. **AI Basics for Non-Programmers**, Tom Taulli
   (Clear explanations of AI data lifecycle and real-world use cases)
3. **Data Preparation for Machine Learning**, Jason Brownlee
   (Conceptual understanding of dataset quality, preprocessing, and pipelines)
4. **Hands-On Data Science for Non-Programmers**, David Meerman Scott
   (Spreadsheet-based data exploration and visualization)
5. You Look Like a Thing and I Love You – Janelle Shane
6. Vibe coding: https://cloud.google.com/discover/what-is-vibe-coding
   https://www.ibm.com/think/topics/vibe-coding
   https://firebase.google.com/docs/studio/prompting
7. Workflow Automation: https://www.ibm.com/think/topics/workflow-automation
   https://www.ibm.com/think/topics/ai-workflow
   https://n8n.io/
8. AI in Cyber Security: https://www.geeksforgeeks.org/ethical-hacking/ai-in-cybersecurity/
9. AI in Networks:
   https://www.cisco.com/site/us/en/learn/topics/artificial-intelligence/what-is-ai-in-networking.html
10. AI in Digital Forensics:
    https://www.eccouncil.org/cybersecurity-exchange/cyber-talks/ai-and-ml-in-digital-forensics-the-future-of-forensic-investigations/