



SPACES

Degree College

AUTONOMOUS

Permanently affiliated to Andhra University
Managed by: Sri Prakash Educational Society

Sri Prakash Academy of Computers, Electronics & Sciences

**Carving
Careers...**



Estd. 1993

BOARD OF STUDIES

2025-26 ACADEMIC YEAR

Subject:

SKILL ENHANCEMENT COURSES

BOARD OF STUDIES MEETING

A.Y 2025-2026

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PREFACE

SPACES Degree College, Payakaraopeta has been conferred the status of an autonomous institution by the competent statutory authorities, in accordance with the provisions under the provisions of clause 13 of UGC regulations 2023, as notified by the University Grants Commission (UGC) vide letter No. F. 2-10/2023(AC-Policy) dated 27.05.2025 and according to the notification of Andhra University with Ref. No. CII (1) Conferment of Autonomous/SPACES/2025 dated 01-07-2025.

The Board of Studies (BoS) is a statutory academic body constituted under the autonomous status of SPACES Degree College, Payakaraopeta, as per the guidelines issued by the University Grants Commission (UGC) dated 3rd April, 2023 and the affiliating university, Andhra University.

The following are the guidelines regarding the composition and functions of Board of Studies of an autonomous college.

Composition of Board of Studies:

- 1.Head of the Department concerned (Chairperson).
- 2.One expert nominated by the Vice-Chancellor from a panel of six recommended by the Autonomous College Principal.
- 3.Two subject experts from outside the parent University nominated by the Academic Council.
- 4.One representative from industry/corporate sector/allied areas to be nominated by the principal.
- 5.One member of the College alumni to be nominated by the Principal.
- 6.All faculty members of the Department.
- 7.Two student members from second and third years

Term: The term of the nominated members shall be three years. **Meetings:** Meeting of the Board of Studies shall be held once in a year.

Functions:

The Board of Studies shall recommend the following to the Academic Council:

- (a)Courses of studies;
- (b)Measures for the improvement of the standards of teaching and research;
- (c)Any other academic matter.

PROCEEDINGS OF THE PRINCIPAL, SPACES DEGREE COLLEGE (AUTONOMOUS) , PAYAKARAOPETA

R.C. NO:1 /A.C/BOS/Members Nomination dated: 03-10-2025

Sub: SPACES Degree College (Autonomous), Payakaraopeta- UG Board of Studies (BOS) -
Nomination of Members – Orders Issued.

Ref: UG Guidelines for Autonomous Colleges (2018)

ORDER:

The Principal, SPACES Degree College (Autonomous), Payakaraopeta is pleased to constitute UG Board of studies in Computer Sciences for Reviewing the syllabi in skill Enhancement Courses subject for I and II semesters duly following the norms of the UGC Autonomous guidelines

S.No.	Category of the Member	Name of the Member	Designation
1	University Nominee	Prof. S. Viziananda Row	Department of Computer Science and Systems Engineering, A.U College of Engineering (A) Visakhapatnam
2	Representative from Industry	Sri. K. Papa Rao	Global Delivery Head, AIIDEN AI, HYD
3	Subject Expert-1	Sri.Rasmi Ranjan Khansama	Department of Computer Science, Govt. College, Tuni.
4	Subject Expert-2	Dr.SuneethaMerugula	Asst. Professor Department of Computer Science & Engineering, GITAM School of Technology, Visakhapatnam
5	Member	Miss. K. Manjusha	Lecturer, Department of Comp. Sci, SPACES Degree College(A), Payakaraopeta
6	Member	Mrs.V Sasikala	Lecturer, Department of Comp. Sci, SPACES Degree College(A), Payakaraopeta
7	Member	Miss. Y. Sravani	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
8	Member	Sri. K.V.Apparao	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
9	Member	Mrs. D.Srilakshmi	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
10	Member	Miss. M.R.M.Harshitha	Lecturer, Department of Computer S cl., SPACES Degree College(A), Payakaraopeta
11	Member	Sri.P.S.Gajapathiraju	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
12	Member	Sri.A.R.V.L.Narayana	Lecturer, Department of Computer Sci., SPACES Degree College(A), Payakaraopeta
13	Student Alumni	Miss. P.Pusha Sri	-
14	BOS Chairman	Sri.S.M.V.S.Kumar	HOD, Department of Computer Science, SPACES Degree College(A), P.R Peta

The above members are requested to attend the BoS meeting on 23rd October 2025 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare and review the syllabi for the subject keeping in line of APSCHE and Affiliating University and interest of the stake holders for consideration and approval of the IQAC and Academic Council.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Suggest the panel of Names to the academic council for appointment of Examiners.
- Coordinate research, teaching, extension and other activities in the Department.



A. R. G. Reddy
PRINCIPAL
SPACES DEGREE COLLEGE
PAYAKARAOPETA

Composition of the Board of Studies (BoS) the Academic Year 2025-26

S.No	Category of the Member	Name of the Member	Designation
1	University Nominee	Prof. S. Viziananda Row	Department of Computer Science and Systems Engineering, A.U College of Engineering (A) Visakhapatnam
2	Representative from Industry	Sri. K. Papa Rao	Global Delivery Head, AIIDEN AI, HYD
3	Subject Expert-1	Sri.Rasmi Ranjan Khansama	Department of Computer Science, Govt. College, Tuni.
4	Subject Expert-2	Dr.Suneetha Merugula	Asst. Professor Department of Computer Science & Engineering, GITAM School of Technology, Visakhapatnam
5	Member	Miss. K. Manjusha	Lecturer, Department of Comp. Sci, SPACES Degree College(A), Payakaraopeta
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SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA

DEPARTMENT OF COMPUTER SCIENCE

BOARD OF STUDIES MEETING

AGENDA

DATE: 23-10-2025

TIME: 11:00 PM

Venue: SPACES Degree College, Payakaraopeta.

Agenda of the Meeting:

1. Welcome and Introduction of Members

2. Presentation & Discussion of the following aspects

- a) To Review the curriculum of I and II semesters of B.Sc – Computer Science/ Artificial Intelligence, Skill Enhancement Courses//BCA Computer Applications / B.Com Computer Applications/ BBA Course with effect from academic year 2025-2026.
- b) To discuss Whether changes are required in the syllabus.
- c) To discuss and propose the criteria and pattern of internal assessment.
- d) To discuss and propose the pattern of external assessment.
- e) To discuss about PO's and PSO's
- f) To discuss Model Question papers for the I and II Semesters including Theory and Practical.
- g) To discuss about blueprint for Internal exams and Semester End Examinations.
- h) To propose the names for Question paper setters and Examiners.
- i) To discuss about remedial classes for Slow learners
- j) To discuss about Organizing Guest lecturers
- k) To discuss about implementation of certificate courses.

3. Suggestions and feedback from experts and Members of the BOS.

4. Any other matter according to the discretion of the Chair person.

5. Resolutions

6. Vote of Thanks



Chairperson

BOARD OF STUDIES

BOARD OF STUDIES

Minutes of the Board of Studies (BoS) Meeting

The First Meeting of the Board of Studies (BoS), Department of Computer Science, SPACES Degree College, was held on 23-10-2025, SPACES Degree College, Payakaraopeta to scrutinize and approve the drafted syllabus of B.Sc./BCA/BBA/B.Com Honours (Major) Skill Enhancement Course under autonomous status.

Agenda Item 1: Welcome and Introduction of Members

The Chairperson welcomed all members and introduced participants, including internal faculty, external experts, industry, and alumni representatives.

Agenda Item 2: Presentation and Ratification of Syllabus

The comprehensive syllabus was presented and discussed. Components reviewed included:

- Program Outcomes (PO), Program Specific Outcomes (PSO), Course Outcomes (CO), Learning Outcomes (LO)
- Theory and Practical syllabi
- Internal and External Assessment schemes
- Model Question Papers and Question Bank Aligning with Bloom's Taxonomy
- Innovative Teaching Methods and Pedagogy
- **Certificate Courses**

Agenda Item 3: Suggestions and Feedback

Suggestions were noted for implementation.

Agenda Item 4: Resolution and Approval of Proposed Syllabus

The Board unanimously approved all syllabus components, assessment schemes, question banks, teaching methodologies, and **certificate courses**.

Agenda Item 5: Any Other Business

No other business was raised.

Agenda Item 6: Vote of Thanks

The Chairperson thanked all members and declared the meeting adjourned.

BOARD OF STUDIES

Minutes of the Board of Studies (BoS) Meeting

The First Meeting of the Board of Studies (BoS), Department of Computer Science, SPACES Degree College, was held on 23-10-2025, SPACES Degree College, Payakaraopeta to scrutinize and approve the drafted syllabus of B.Sc. Artificial Intelligence Honours. (Major) under autonomous status.

Agenda Item 1: Welcome and Introduction of Members

The Chairperson welcomed all members and introduced participants, including internal faculty, external experts, industry, and alumni representatives.

Agenda Item 2: Presentation and Ratification of Syllabus

The comprehensive syllabus was presented and discussed. Components reviewed included:

- Program Outcomes (PO), Program Specific Outcomes (PSO), Course Outcomes (CO), Learning Outcomes (LO)
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- Internal and External Assessment schemes
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- Innovative Teaching Methods and Pedagogy
- **Certificate Courses**

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Suggestions were noted for implementation.

Agenda Item 4: Resolution and Approval of Proposed Syllabus

The Board unanimously approved all syllabus components, assessment schemes, question banks, teaching methodologies, and **certificate courses**.

Agenda Item 5: Any Other Business

No other business was raised.

Agenda Item 6: Vote of Thanks

The Chairperson thanked all members and declared the meeting adjourned.

The following members were present

S.No	Name	Designation	Signatures
1	Sri S.M.V.S Kumar	Chairperson	Sri S.M.V.S Kumar
2	Prof. S. Viziananda Row	University Nominee	Prof. S. Viziananda Row
3	Sri. Rasmi Ranjan Khansama	Subject Expert	Rasmi
4	Dr. Suneetha Merugula	Subject Expert	Suneetha M.
5	Sri K Papa Rao	Industry Expert	K. Papa Rao
6	Miss. P.Pusha Sri	Alumna	P. pushpa Sri
7	Sri. K.V.Apparao	Member	K.V. Apparao
8	Mrs. D.Srilakshmi	Member	D. Srilakshmi
9	Miss. M.R.M.Harshitha	Member	M. Harshitha
10	Sri.P.S.Gajapathiraju	Member	P.S. Gajapathiraju
11	Sri.A.R.V.L.Narayana	Member	A.R.V.L. Narayana
12	Miss. Y Sravani	Member	Y. Sravani
13	Mrs.V.Sasikala	Member	V. Sasikala
14	Miss. K Manjusha	Member	K. Manjusha
15	Dr.V.V.S S B Bangarraju	Dean-Academics	V.V.S S B Bangarraju
16	Dr.A K Tripathy	IQAC Coordinator	A. K. Tripathy
17	Dr A Rama Krishna Reddy	Principal	A.R.K. Reddy

SPACES DEGREE COLLEGE(AUTONOMOUS), PAYAKARAOPETA

DEPARTMENT OF COMPUTER SCIENCE

BOARD OF STUDIES MEETING – RESOLUTIONS

Date: 23-10-2025

Time: 11:00 Noon to 12:30 PM

Resolution1:

It was resolved that the allotted credits and workload particulars for skill enhancement courses in semester I -AI Fundamentals and semester-II – Applications of Artificial Intelligence Theory will remain unchanged and continue to follow the APSCHE norms. In semester I AI Fundamentals carries 4 credits for Theory and practice sessions for practical's, with 3 hours of theory and 2 hours of practicals per week . In semester II Applications of Artificial Intelligence carries 3 credits for Theory and 1 credit for practical's, with 3 hours of theory and 2 hours of practical's per week The detailed paper titles, curriculum frame work including credits and hours/ week were presented in **Annexure -1**.

Resolution2:

It was resolved to make certain changes to the existing syllabus issued by APSCHE. The modifications are as follows:

Semester -1

Skill Enhancement Course I – AI Fundamentals Paper

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

Skill Enhancement Course I – AI Fundamentals Paper- Practical

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

Semester-2:

Skill Enhancement Course I – Applications of Artificial Intelligence Paper – Theory Paper

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

Skill Enhancement Course I – Applications of Artificial Intelligence Paper– Practical

No changes were proposed; it was resolved to adopt the syllabus as it is issued by APSCHE.

The changes made in the syllabus, along with their justifications were presented in **Annexure -2.**

Resolution3:

It was resolved that the evaluation of each paper will be 100 marks in theory and 50 marks in practical. The theory component includes both internal and external assessments. The mode of internal and external assessment shall be followed as per the guidelines of the affiliating Andhra University. As per the University's current norms, 30 marks will be allotted for Internal assessment and 70 marks will be allotted for external assessment. Students should secure a minimum of 40% in both internal and external assessments to qualify for a pass. The details of internal and external assessments along with qualifying marks, were presented in **Annexure -3.**

Resolution4:

It was resolved that the internal assessment of students will be based on the performance in mid examinations, student seminars, assignments, and attendance. Two mid examinations will be conducted in each semester for 50 marks each and scaled down to 10 marks. The breakup of internal marks is as follows:

Mid-1: 10 marks, Mid 2: 10 Marks, Seminar and assignment-5 marks and attendance -5 marks.

Resolution5:

The blue print and Model question paper for internal assessment were reviewed, discussed and approved for implementation. It was resolved that the first mid examination is to be conducted for first two units and second mid examination is to be conducted for next 2 units. The detailed blue print and model question paper were presented in **Annexure- 4**.

Resolution6:

The blue print and Model paper for Semester End examination were reviewed, discussed and approved for implementation. It was resolved to conduct semester end examination for 70 marks consisting of essay type questions and short answer questions. The detailed blue print and model question paper were presented in **Annexure- 5**.

Resolution7 :It was resolve to conduct remedial classes for slow learners after Mid -1 Examinations to help improve their academic performance.

Resolution8:

The BOS resolved to organize guest lectures by inviting subject experts from reputed institutions and industries to enhance student's exposure and knowledge.

Resolution 9:

The list of question paper setters and examiners for Skill Enhancement Course was presented, discussed and approved by the board. The list of question paper setters and examiners, were presented in **Annexure -6**.

The Chairperson thanked all members for their active participation and valuable inputs. The meeting concluded with all the above resolutions being passed unanimously.

The above resolutions were approved

S.No	Name	Designation	Signatures
1	Sri S.M.V.S Kumar	Chairperson	S.M.V.S. Kumar
2	Prof. S. Viziananda Row	University Nominee	Prof. S. Viziananda Row
3	Sri. Rasmi Ranjan Khansama	Subject Expert	Rasmi
4	Dr. Suneetha Merugula	Subject Expert	Suneetha M
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6	Miss. P.Pusha Sri	Alumna	p. pushpa Sri .
7	Sri. K.V.Apparao	Member	K.V. Apparao
8	Mrs. D.Srilakshmi	Member	D. Srilakshmi
9	Miss. M.R.M.Harshitha	Member	M. Harshitha
10	Sri.P.S.Gajapathiraju	Member	P.S. Gajapathiraju
11	Sri.A.R.V.L.Narayana	Member	A.R.V.L. Narayana
12	Miss. Y Sravani	Member	Y. Sravani
13	Mrs.V.Sasikala	Member	V. Sasikala
14	Miss. K Manjusha	Member	K. Manjusha
15	Dr.V.V.S B Bangarraju	Dean-Academics	V. Bangarraju
16	Dr.A K Tripathy	IQAC Coordinator	A. K. Tripathy
17	Dr A Rama Krishna Reddy	Principal	A. Rama Krishna Reddy

PROGRAMME OUTCOMES (POs)

Students of Undergraduate Programme (B. Sc, B. Com, BCA) at the time of graduation will be able to:

PO1: Domain Expertise:

- ✓ Acquire comprehensive knowledge and Skills.
- ✓ Make use of knowledge In an innovative manner.
- ✓ Effectively apply the knowledge and skills to address various issues.

PO2: Life- long learning:

- ✓ Learn "How to learn" — self motivated and self directed learning
- ✓ Be inquisitive and establish cause and effective relationship
- ✓ Adapt to the ever emerging demand of work place and life.

PO3: Problem Solving:

- ✓ Predict and analyze problems
- ✓ Frame hypothesis
- ✓ Investigate and interpret empirical data.
- ✓ Plan and Execute action

PO4: Good at Communication and Life Skills:

- ✓ Express thoughts in an effective manner
- ✓ Listen, understand and project views in a convincing manner
- ✓ Develop skills to present significant information clearly and concisely to interested groups.

PO5: Computing Skills and Ethics:

- ✓ Develop rationale and scientific thinking process..
- ✓ Use technology intelligently for communication entertainment and for the benefit of man-kind.
- ✓ Ensures ethical practices throughout ones endeavors for the well being of human race.
- ✓

PO6: Modern Equipment Usage:

- ✓ Use ICT effectively
- ✓ Access, retrieve and use authenticated information.

PO7: Environmental sustainability:

- ✓ Think critically on environment sustainability measures.
- ✓ Propagate and follow environment friendly practices.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

PSO1: Understand the fundamental theories, concepts and applications in basic areas of research in Computer Science

PSO 2: To Provide adequate understanding about computer science and its applications.

PSO 3: To understand the principles and working of computer systems and be able to apply computational knowledge and project development skills to provide innovative solutions.

PSO4: To design and develop computer programs and understand the structure and development methodologies of software systems.

PSO5: To apply their skills in the field of algorithms, web designing, Software development and data analytics.

PSO6: To inculcate training and practical approach , internship is given to be trained among the students in the field of Computer Science.

PSO7: To equip the students with sufficient exposure and skills to enable them in attaining a deserving position in software industry.

Annexure- 1

Skill Enhancement Courses

Course Structure(A.Y. 2025-26) - 1st Year

Year	Semester	Course	Course Title	No.of Hours (Theo ry)	No of Hours (Practical)	Total No. of Hours	No.of Credits (Theory)	No.of Credits (Practical)	Total No. of Credits
I YEAR	Semester-1	1	AI Fundamentals	3	2	5	4	0	4
	Semester-2	2	Applications of Artificial Intelligence	3	2	5	3	1	4

Annexure -2

ADDITIONAL INPUTS/MODIFICATIONS IN THE SYLLABUS- SEMESTER I

COURSE-1 (AI Fundamentals)

S.No	Course Title	Unit	Added topics	Deleted Topics	Justification
1	AI Fundamentals	---	NIL	NIL	---
3	AI Fundamentals- Practice Session	---	NIL	NIL	---

ADDITIONAL INPUTS/MODIFICATIONS IN THE SYLLABUS- SEMESTER II

COURSE-1 (Applications of Artificial intelligence)

S.No	Course Title	Unit	Added topics	Deleted Topics	Justification
1	Applications of Artificial intelligence	-	NIL	NIL	NIL
2	Applications of Artificial intelligence- Practical	-	NIL	NIL	NIL

Annexure-3

Internal & External Assessment Evaluation Pattern

INTERNAL ASSESSMENT

S.No	Examination	Marks	Scaled down	Duration
1	Mid Exam 1	50	10	2 hrs
2	Mid Exam 2	50	10	2hrs
3	Seminar & Assignments,	-	05	
4	Attendance	-	05	
Total			30	

EXTERNAL ASSESSMENT

Examination	Marks	Duration
Theory Examination	70	3 Hours
Practical Examination	50	3 Hours

Assessment and Qualifying Marks

S. No	Assessment	Total Marks	Qualifying Marks
1	Internal Assessment	30	12
2	Semester End Exam - Theory	70	28
3	Semester End Exam- Practical Lab	50	20

Internal Assessment Breakup

S. No	Activity	Marks Allotted
1	Mid -term Examination 1	10
2	Mid -term Examination 2	10
3	Student Seminars & Assignments	05
4	Attendance	05

Rubrics for Awarding Attendance marks

S. No	Attendance Percentage	Marks allotted
1	75%	1
2	76 – 80 %	2
3	81 – 85 %	3
4	86 – 90 %	4
5	90.01 to 100 %	5

Annexure – 4

SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA
Skill Enhancement Course

Blueprint – Mid Examination

Max Marks :50

Duration: 2 hours

Question Type	Questions to be given	Questions to Answer	Marks per Question	Total Marks
Short Questions	7	5	4	20
Essay Questions	6	3	10	30
Total	-	-	-	50

Annexure – 5

SPACES DEGREE COLLEGE (AUTONOMOUS), PAYAKARAOPETA
Skill Enhancement Course

Blueprint – Semester End Theory & Practical Examinations

Blue print for Theory Examination

Max Marks :70 Marks

Credits: 3

Duration: 3 Hours

Question Type	Questions to be Given	Questions to Answer	Marks per Question	Total Marks
Short Questions	8	5	4	20
Essay Questions	10	5	10	50
Total	-	-	-	70

Blue print for Practical Examination

Max Marks: 50 Marks

Credits: 1

Duration: 3 Hours

Component	Max Marks
Documentation / Practical Writing	10
Practical Execution	20
Record submission	10
Viva	10

**Model Syllabus for 4-Year UG Honours in
B.Sc./BCA/BBA/B.Com as Major in consonance with Curriculum
framework w.e.f. AY 2025-26**

SEMESTER-I

COURSE 1: COURSE 1: AI FUNDAMENTALS

Theory

Credits: 4

4hrs/week

LEARNING OBJECTIVES:

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

Course Outcomes

Students will be able to

- Describe the different subfields and their roles in AI applications.
- Analyze the benefits and limitations of AI in diverse domains.
- Evaluate AI systems in terms of inclusivity, privacy, and robustness.
- Describe Generative AI and emerging technologies like ChatGPT.
- 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 , Zebra Learn, 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’.”

Course: 1 – AI FUNDAMENTALS

Credits:4

BLUE PRINT

Unit	Shorts	Essays(Internal choice)
Unit 1	2	2
Unit 2	1	2
Unit 3	2	2
Unit 4	2	2
Unit 5	1	2
Total	8 Out of 8, 5 questions should be answered $5 \times 4 = 20$ Marks	10 Out of 10, 5 questions should be answered $5 \times 10 = 50$ Marks

Course: 1 – AI FUNDAMENTALS

Credits:4
BLUE PRINT

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-III
5. Unit-III
6. Unit-IV
7. Unit-IV
8. Unit-V

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Unit I
Or
B) Unit I
10. A) Unit II
Or
B) Unit II
11. A) Unit III
Or
B) Unit III
12. A) Unit IV
Or
B) Unit IV
13. A) Unit V
Or
B) Unit V

Course-1(Semester -II)

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, Micro-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**

**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

3. Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms relevant to biological sciences.
4. Familiarize students with different types of datasets and public repositories used in AI research.
5. Develop skills in building AI data pipelines through collection, annotation, cleaning, and preprocessing.
6. Explore real-world applications of AI in agriculture, ecology, zoology, and environmental sciences.
7. 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

12. 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:**
 - Open Orange → Add *File* widget → Load a CSV (e.g., Titanic dataset).
 - Connect to *Data Table* → View rows/columns.
 - Connect to *Data Info* → Check attributes, data types.
 - 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:**
 - Load dataset.
 - Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
 - Compare cleaned vs. original in *Data Table*.
 - *Distributions* widget.
 - 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:**
 - Load Titanic dataset.
 - Connect *File* → *Data Sampler* (70% train, 30% test).
 - 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 Recognition

- **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

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

13. 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.

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

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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 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

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Practical

Credits: 1

2 hrs/week

Suggested Lab Practical's (No Coding)

Lab 1 - Exploring Public Datasets (Orange Data Mining)

1. Visit a public repository (Kaggle, UCI, data.gov.in)
2. Download a dataset (e.g., rainfall data, literacy rates, or traffic accident statistics)
3. **Procedure:**
 - Open Orange → Add *File* widget → Load a CSV (e.g., Titanic dataset).
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4. **Observation:** Note numeric, categorical, missing values.
5. **Outcome:** Students understand structured data format in CSV.

Lab 2 - Understanding Dataset Metadata and Formats

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

Lab 3 - Data Annotation Exercise

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

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13. Aim: To clean dirty data and visualize categorical and numeric attributes.

14. Procedure:

- Load dataset.
- Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
- Compare cleaned vs. original in *Data Table*.
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- Check various features distribution.

(Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)

15. Observation: Missing values filled with mean/median., Graphical representation of data.

16. Outcome: Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 5: Train/Test Split in Orange

17. Aim: To split dataset for AI training/testing.

18. Procedure:

- Load Titanic dataset.
- Connect *File* → *Data Sampler* (70% train, 30% test).
- Connect outputs to *Data Table* widgets to view.

19. Observation: Students see two different subsets.

20. 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:

1. Calculate similarity between users.
2. Group similar users and recommend products based on cluster behavior.
3. 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:

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

6. 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:

7. Clean and tokenize review text.
8. Train a sentiment classifier.
9. 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:

10. Train a regression model to forecast sales.
11. Visualize predictions vs. actuals.
12. 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:

13. Train a model to predict hiring decisions.
14. Analyze performance across demographic groups.
15. 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:

16. Train and evaluate a churn prediction model.
17. Interpret ROC curves and accuracy.
18. 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:

19. Screen resumes based on job fit.
20. Segment customers by behavior or demographics.
21. 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)
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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

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

SEMESTER-II

COURSE 1: APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Theory

Credits: 33 hrs/week Course Objectives

1. Provide a foundation in the AI ecosystem, including hardware, cloud, and edge platforms,
2. in a non-technical way for Arts and Social Sciences students.
3. Familiarize students with data types, sources, and public repositories that fuel AI applications in society and humanities.
4. Explain the process of preparing and managing AI data pipelines through collection, annotation, and cleaning.
5. Explore real-world applications of AI in arts, culture, literature, linguistics, and languages.
6. 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

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

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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).

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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

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

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:
 1. “A painting of Bharat Mata in Picasso style.”
 2. “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.

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

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

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:

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

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 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

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:**
 - Open Orange → Add *File* widget → Load a CSV (e.g., Titanic dataset).
 - Connect to *Data Table* → View rows/columns.
 - Connect to *Data Info* → Check attributes, data types.
 - 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 challenge

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

- **Aim:** To clean dirty data and visualize categorical and numeric attributes.
- **Process:**
 - Load dataset.
 - Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
 - Compare cleaned vs. original in *Data Table*.
 - *Distributions* widget.
 - 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:**
 - Load Titanic dataset.
 - Connect *File* → *Data Sampler* (70% train, 30% test).

- 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 /hEMBL 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.*

Books/References

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

<https://www.borntoengineer.com/how-is-artificial-intelligence-is-helping-us-learn-about-the-universe>

<https://primo.ai/index.php/Astronomy>

- CERN datasets for Particle Physics: <https://opendata.cern.ch/>
- AI in Material Science:

<https://deepmind.google/discover/blog/millions-of-new-materials-discovered-with-deep-learning/>

<https://www.temasek.com.sg/content/dam/temasek-corporate/news-and-views/resources/reports/ai-meets-materials.pdf>

- AI in Energy: <https://www.xenonstack.com/blog/ai-renewable-energy-production>

<https://www.sandtech.com/insight/how-ai-is-transforming-the-future-in-energy-management/>

- AI in Chemistry:

<https://chemintelligence.com/ai-for-chemistry>

<https://deepmind.google/science/alphafold/>

<https://aimagazine.com/articles/alphafold-2-the-ai-system-that-won-google-a-nobel-prize>

<https://blog.google/technology/ai/google-deepmind-isomorphic-alphafold-3-ai-model/#life-molecules>

- AI in Drug Discovery:

<https://www.ddw-online.com/the-promise-of-ai-advancing-drug-discovery-with-ultra-large-library-processing-29063-202403/>

<https://www.medchemexpress.com/ai-driven-drug-screening.html?srsId=AfmBOoqhDeVNqW9S5vn1m4FZargNAKEFdOKaPvwsnOIzenQEEJoWkz8J>

- AI in Optimization Problems:

<https://throughput.world/blog/ai-in-transportation-and-logistics/>

<https://codewave.com/insights/ai-transforming-transportation-logistics/>

- AI in Remote Sensing:

<https://www.satimagingcorp.com/applications/artificial-intelligence-ai/>

16. 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

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, vite 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, vite 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.

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)

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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-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)

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

Lab 2 - Exploring Cybersecurity Datasets (Orange Data Mining)

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

Lab 3 - Understanding Dataset Metadata and Formats

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

Lab 4 - Data Annotation Exercise

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

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

17. **Aim:** To clean dirty data and visualize categorical and numeric attributes.

18. **Procedure:**

- Load dataset.
- Connect *File* → *Edit Domain* (to change types) and *Impute* (to fill missing values).
- Compare cleaned vs. original in *Data Table*.
- *Distributions* widget.
- Check various features distribution.

(Optional: Create simple bar charts/line charts to visualize trends using Google Looker Studio)

19. **Observation:** Missing values filled with mean/median., Graphical representation of data.

20. **Outcome:** Learn importance of data cleaning., Students learn importance of visualization in preprocessing.

Lab 6: Train/Test Split in Orange

21. **Aim:** To split dataset for AI training/testing.

22. **Procedure:**

- Load Titanic dataset.
- Connect *File* → *Data Sampler* (70% train, 30% test).

- Connect outputs to *Data Table* widgets to view.
23. **Observation:** Students see two different subsets.
24. **Outcome:** Concept of model validation using split data.

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

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

Lab 8 – Create a Portfolio Website using Vibe Coding Tool

28. **Objective:** Learn how AI-assisted coding tools can automatically generate websites from simple instructions.
29. **Activity:**
- Open **Vibe Coding Tool** (Windsurf/Cursor/Firebase Studio/Any other vibe coding tool).
 - 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.”
 - Experiment with different prompts to change **layout, theme, or color scheme** (e.g., *“Make it a modern dark theme with blue highlights.”*).
 - Preview the generated site and customize content.
30. **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

31. **Objective:** Understand AI's role in creating **educational applications**.

32. **Activity:**

- Open **Vibe Coding Tool**.
- Give prompt:

“Build an interactive quiz app for students with multiple-choice questions on AI basics. Include features: Start Quiz, Show Score, Retry.”

- Refine the app by asking AI to:
 - Add **timer** for each question.
 - Show **correct/incorrect answers** instantly.
 - Add a **Leaderboard** page.
- Test the app by playing the quiz.

33. **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:

- **Trigger Node:** Google Sheets (watch new row for feedback).
- **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.)

- **Action Node:** Gmail → email summarized feedback to teacher.
- **Test:** Enter sample feedback in Google Sheet → receive AI summary via email.
- **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-](https://support.google.com/docs/answer/15820999?visit_id=638919819014625788-1742465261&p=ai-function&rd=1)

[1742465261&p=ai-function&rd=1](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/>

MODEL PAPERS

COURSE 1: AI FUNDAMENTALS (SEMESTER-1)

Credits:3

MODEL PAPER

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Define Artificial Intelligence with an example?
2. What are the main challenges of AI ?
3. List applications of AI in Finance.
4. How AI used in Transportation? Give an example?
5. What is meant by Ethics in AI?
6. What is Prompt Engineering and why is it important?
7. Write short notes on ChatGPT?
8. How can AI tools be used for Content Creation?

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. A) Write about applications of AI.
Or
B) Explain about Machine Learning, Computer Vision and NLP with examples?
10. A) Discuss the role of AI in Healthcare and Retail.
Or
B) Explain how AI is applied in Agriculture and Education sectors.
11. A) Discuss Security, Privacy, and Reliability issues in AI.
Or
B) Write about Transparency and fairness in AI systems?
12. A) Explain about Generative AI tools?
Or
B) Write about Emerging trends and future directions in AI?
13. A) Write about applications of Prompt Engineering?
Or
B) Write about designing thumbnails and channel branding with AI?

COURSE 1: Applications of Artificial Intelligence (SEMESTER-2)

Credits:3

MODEL PAPER

SECTION -A

Answer any 5 questions .Each question carries 4 marks. (5 x 4 =20)

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-III
5. Unit-III
6. Unit-IV
7. Unit-IV
8. Unit-V

SECTION- B

Answer all questions. Each question carries 10 marks. (5 x 10 =50)

(Each question (both A or B) from each Unit.

9. **A)** Unit I
 Or
 B) Unit I
10. **A)** Unit II
 Or
 B) Unit II
11. **A)** Unit III
 Or
 B) Unit III
12. **A)** Unit IV
 Or
 B) Unit IV
13. **A)** Unit V
 Or
 B) Unit V

Annexure-6

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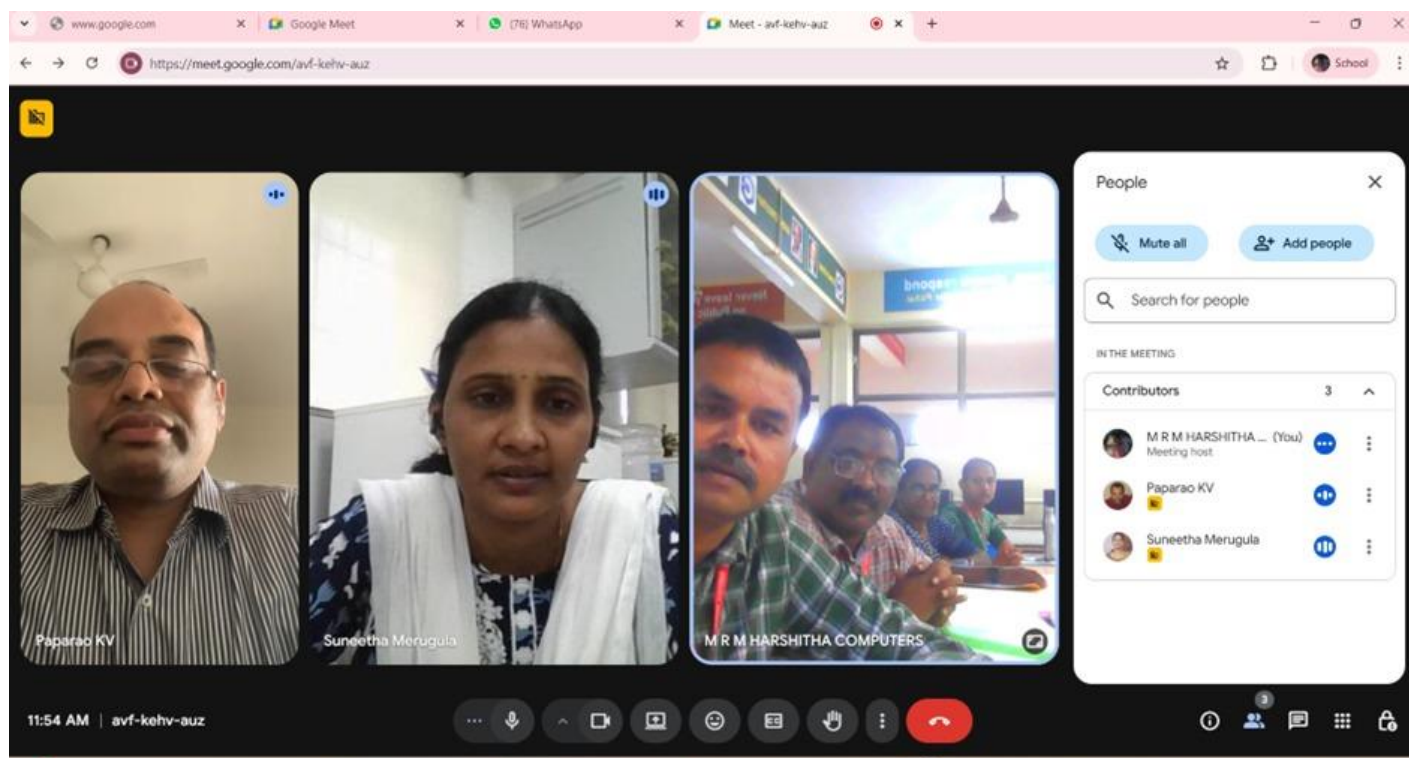
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DEPARTMENT OF COMPUTER SCIENCE
BOARD OF STUDIES MEETING



Date: 23-10-2025

Time: 11 a.m to 12.30 p.m

Mode: off-line & On-line

Link: <https://meet.google.com/avf-kehv-auz>





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