SYLLABUS	
SIGNATURE COURSE	
Name of the College	Alphonsa College, Pala
Faculty/ Discipline	Zoology
Programme	BSc (Hons) Zoology
Course Coordinator	Poornima Baby
Contributors	
Course Name	ARTIFICAL INTELLIGENCE IN BIOLOGICAL SCIENCES
Type of Course	DSE
Specialization title	This Signature Course does not have a specialization.
Course Code	MG4DSEZGYA02
Course Level	200
Course Summary	This course provides an interdisciplinary introduction to the foundational concepts of Artificial Intelligence (AI) and its transformative applications in the biological sciences. It explores the synergy between AI and biology through real-world examples and introduces essential AI methodologies like machine learning, deep learning, and natural language processing. Students will gain insight into how AI tools can enhance data analysis, automate research workflows, and improve experimental precision in biology

Semester	4	**Credits**			4	**Total Hours**
Course Details	**Learning Approach**	Lecture	Tutorial	Practical	Others	
		4	0	0	0	60

Pre-requisites, if any	

Course Outcomes (CO)

Number of COs		**5**	
CO No.	**Expected Course Outcome**	**Learning Domains ***	**PO No**
1	Understand the basic definition, scope, and history of AI in biological sciences.	K	PO3
2	Explain the importance of AI for analyzing biological data and improving research workflows	U	PO1
3	Appreciate the integration of AI in enhancing experimental precision and reducing human error	A	PO2
4	Describe and differentiate between major AI methodologies (ML, DL, NLP, CV).	U	PO3
5	Discuss ethical considerations and responsible use of AI in biological research	I	PO8

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

CO-PO Articulation Matrix

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	-	-	3	-	-	-	-	-	-	-
CO 2	2	-	-	-	-	-	-	-	-	-
CO 3	-	2	-	-	-	-	-	-	-	-
CO 4	-	-	2	-	-	-	-	-	-	-
CO 5	-	-	-	-	-	-	-	3	-	-

'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).

Course Content

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs	CO No.
1		AI and the Life Sciences: History, Applications, and Integration		
	1.1	Definition and scope of Artificial Intelligence (AI)	3	["1"]
	1.2	Historical development ofAI applications in biological sciences	3	["1", "4"]
	1.3	Synergy between AI and biology: Why biological sciences need AI	3	["2"]
2		Artificial Intelligence in Biological Data Analysis and Laboratory Automation		
	2.1	Introduction to biological big data (genomics, proteomics, etc.) AI tools for data visualization and pattern recognition	7	["2", "3"]
	2.2	Automating repetitive tasks in biological research: • Laboratory automation using AI • Image analysis in microscopy and histology	7	["3"]
	2.3	Enhancing the precision and accuracy of experiments • AI in experimental design and planning • Error reduction through machine learning algorithms	7	["4", "5"]
3		Ethical considerations in AI		
	3.1	Ethical use of AI in healthcare and biology	4	["5"]
	3.2	Data privacy and ownership in biological datasets Algorithmic bias and its consequences	6	["5"]
	3.3	Transparency, accountability, and regulatory frameworks of AI	5	["5"]
4		Beginner-Friendly AI Platforms and Ethical Data Use in Biological Sciences		
	4.1	• Overview of beginner-friendly platforms (e.g., Google Colab, KNIME, Teachable Machine)	6	["2"]
	4.2	Dataset handling using simple CSV files Loading and visualizing biological datasets (e.g., DNA sequences, plant images)	7	["3"]
	4.3	Reflection activity and report on responsible AI use in biology	2	["5"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lectures, Demonstrations, Video Tutorials, Case Study Analysis, Discussions

Assessment Types	**MODE OF ASSESSMENT** Mode of Assessment: Theory **A. Continuous Comprehensive Assessment (CCA)** **• Theory – 30 Marks** Quiz, Test Papers, seminar, submission of group activity **B. End Semester Evaluation (ESE)** **• Theory – 70 Marks** Assessment Methods – Written examination Duration of Examination – 2.00 Hrs Pattern of examination for Theory – Non-MCQ Different parts of written examination – Part - A , B , C Answer Type: ◦ PART - A ◦ MCQ - (20 out of 20) – 20 × 1 = 20 ◦ PART - B ◦ Short answer - (10 out of 12) – 10 × 3 = 30 ◦ PART - C ◦ Short Essays/Problems - (4 out of 7) – 4 × 5 = 20

References

- • Ching, T., Himmelstein, D. S., et al. (2018). Opportunities and obstacles for deep learning in biology and medicine. Journal of The Royal Society Interface. • Larranaga, P., Calvo, B., et al. (2006). Machine learning in bioinformatics. Briefings in Bioinformatics. Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press. • Mitchell, T. M. (1997). Machine Learning. McGraw Hill.

Suggested Readings

- Chicco, D., & Jurman, G. (2020). Machine learning can predict survival of patients with heart failure from serum creatinine and ejection fraction alone. BMC Medical Informatics and Decision Making, 20(1), 16. [Focus: Application of ML in biological data] Camacho, D. M., et al. (2018). Next-generation machine learning for biological networks. Cell, 173(7), 1581–1592. Libbrecht, M. W., & Noble, W. S. (2015). Machine learning applications in genetics and genomics. Nature Reviews Genetics, 16(6), 321–332 Floridi, L., et al. (2018). AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. Minds and Machines, 28, 689–707.

Affidavit

- We, Alphonsa College, Pala and Poornima Baby, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.

- We, Alphonsa College, Pala, agree to appoint a new course coordinator for the proposed ARTIFICAL INTELLIGENCE IN BIOLOGICAL SCIENCES in the event of the unavailability of the currently nominated coordinator. This appointment will ensure the continued coordination of course delivery, assessments, and all related academic responsibilities necessary for the successful implementation of the signature course, for as long as the college offers this programme.

- We, Alphonsa College, Pala and Poornima Baby, declare that no part of this signature course submitted here for approval has been taken from the course content developed by, or from any of the course titles prepared by, the BoS/expert committee in the same discipline under our University.