

	MAHATMA GANDHI UNIVERSITY Kottayam, Kerala Undergraduate Programmes (HONOURS) 2026 Admission Onwards
---	---

SYLLABUS									
SIGNATURE COURSE									
Name of the College	SSV College, Valayanchirangara P.O, Perumbavoor								
Faculty/ Discipline	Mathematics								
Programme	BSc (Hons) Mathematics								
Course Coordinator	Remya Radhakrishnan								
Contributors	Dr. Jebin Jacob, Anju Mary Mathew								
Course Name	INTRODUCTION TO ARTIFICIAL INTELLIGENCE								
Type of Course	DSE								
Specialization title	Artificial Intelligence and Machine Learning with Data Science								
Course Code	MG3DSEMATA05								
Course Level	200								
Course Summary	This course introduces the basic concepts of Artificial Intelligence, including its evolution, categories, and applications. It focuses on AI problem solving using state space representation, production systems, and search techniques. Students learn uninformed and informed search strategies, constraint satisfaction problems, and logical reasoning methods. The course also covers knowledge representation, planning techniques, and AI tools. Ethical issues, safety concerns, and the future directions of AI are briefly discussed.								
Semester	3	Credits	4						
Course Details	<table><tr><td>Learning Approach</td><td>Lecture</td><td>Total Hours</td></tr><tr><td>Credits</td><td>4</td><td>60</td></tr></table>			Learning Approach	Lecture	Total Hours	Credits	4	60
	Learning Approach	Lecture	Total Hours						
Credits	4	60							
Pre-requisites, if any	Basics of Mathematics, Logical reasoning, and Computer fundamentals.								

Course Outcomes (CO)

Number of COs		6	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain the fundamental concepts of Artificial Intelligence, its evolution, and evaluate the significance of the Turing Test in assessing machine intelligence	U	PO1, PO2
2	Classify different categories of AI and analyze real-world applications of AI across various domains.	An	PO1, PO2, PO3
3	Formulate AI problems using state space representation, and explain production systems and control strategies for problem solving	A	PO2, PO3, PO4
4	Apply problem-solving and search techniques using uninformed and informed search strategies to solve AI problems.	A	PO2, PO3, PO6, PO8, PO9

Number of COs		6	
CO No.	Expected Course Outcome	Learning Domains *	PO No
5	Analyze constraint satisfaction problems, logical reasoning systems, and knowledge-based agents using propositional and first-order logic.	An	PO2, PO3, PO9, PO10
6	Explain knowledge representation techniques, planning methods, and evaluate AI tools, ethical issues, and future directions of AI	U	PO5, PO7, PO10

*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	3	-	-	-	-	-	-	-	-
CO 2	3	2	2	-	-	-	-	-	-	-
CO 3	-	3	3	3	-	-	-	-	-	-
CO 4	-	2	2	-	-	3	-	3	3	-
CO 5	-	2	2	-	-	-	-	-	3	3
CO 6	-	-	-	-	3	-	3	-	-	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	Introduction to AI			
	1.1	Introduction to AI, Evolution of AI, Turing test	5	["1"]
	1.2	Categories of AI, Applications of AI	5	["2"]
	1.3	Problem Definition as a State Space Search	3	["3"]
	1.4	Production System, Control Strategies	2	["3"]
2	Problem Solving			
	2.1	Problem Solving - Solving problems by searching	5	["4"]
	2.2	Uninformed and Informed search strategies (Breadth First Search, Depth First Search, uniform cost search, iterative deepening, Hill climbing, Heuristics Search Techniques: Best First Search, A* algorithm, AO* algorithm, Min-max, Alpha - Beta pruning)	5	["4"]
	2.3	Constraint satisfaction problems	5	["5"]

Module	Units	Course Description	Hrs	CO No.
3		First order logic		
	3.1	First order logic, Propositional logic	3	["5"]
	3.2	Knowledge based agents, Agents based on propositional logic	4	["5"]
	3.3	Knowledge Representation - Ontological Engineering,	4	["6"]
	3.4	Planning - Classical Planning, Heuristics for Planning and Hierarchical Planning	4	["6"]
4		AI Hardware and Software Tools		
	4.1	AI Hardware and Software Tools	5	["6"]
	4.2	The Ethics of AI, AI Safety	4	["6"]
	4.3	AI applications	3	["6"]
	4.4	Future of AI- AI Components	3	["6"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lectures. Demonstrations of AI techniques and algorithms Hands-on model practical sessions Group discussions and collaborative Assignments and quizzes
---------------------------------------	---

Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Module Tests, Quiz, Assignment
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods - 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 ◦ Short answer - (5 out of 8) - $5 \times 2 = 10$ ◦ PART - B ◦ Short Essays - (5 out of 8) - $5 \times 6 = 30$ ◦ PART - C ◦ Essays - (3 out of 6) - $3 \times 10 = 30$

References

- Alpaydin, Ethem. Machine Learning: The New AI. MIT Press, 2016
- Russell, Stuart, Peter Norvig. Artificial Intelligence: A Modern Approach. 3rd ed. Pearson Education, 2010.

Suggested Readings

- Rich, Elaine, Kevin Knight, and Shivashankar B. Nair. Artificial Intelligence. 3rd ed., Tata McGraw-Hill, 2010.

- George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving. 6th ed. Pearson Education, 2009.
- Patrick Henry Winston. Artificial Intelligence. 3rd ed. Addison-Wesley, 1992.

Affidavit

- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.
- We, SSV College, Valayanchirangara P.O, Perumbavoor, agree to appoint a new course coordinator for the proposed Artificial Intelligence and Machine Learning with Data Science 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 specialization, for as long as the college offers this programme.
- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, 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.

	MAHATMA GANDHI UNIVERSITY Kottayam, Kerala Undergraduate Programmes (HONOURS) 2026 Admission Onwards
---	---

SYLLABUS			
SIGNATURE COURSE			
Name of the College	SSV College, Valayanchirangara P.O, Perumbavoor		
Faculty/ Discipline	Mathematics		
Programme	BSc (Hons) Mathematics		
Course Coordinator	Remya Radhakrishnan		
Contributors	Dr.Jebin Jacob		
Course Name	FUNDAMENTALS OF MACHINE LEARNING		
Type of Course	DSE		
Specialization title	Artificial Intelligence and Machine Learning with Data Science		
Course Code	MG4DSEMATA05		
Course Level	200		
Course Summary	This course introduces the fundamental concepts of machine learning with a strong emphasis on mathematical and statistical foundations. It covers types and applications of machine learning, data exploration, data quality, and pre-processing techniques. Students learn model selection, training, representation, interpretability, and performance evaluation. The course also emphasizes feature engineering, including feature transformation and subset selection. Statistical tools essential to machine learning—such as discrete probability distributions, multiple random variables, sampling distributions, hypothesis testing, and Monte Carlo approximation—are discussed. Designed for B.Sc. Mathematics students, the course bridges theory and practice, preparing learners for advanced study and real-world data-driven applications.		
Semester	4	Credits	4
Course Details	Learning Approach	Lecture	Total Hours
	Credits	4	60
Pre-requisites, if any	Fundamentals of calculus and statistics.		

Course Outcomes (CO)

Number of COs		4	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand and explain the basic concepts, types, applications, tools, and challenges of machine learning, and perform basic data exploration, quality assessment, and pre-processing.	U	PO1, PO2, PO3, PO4, PO10
2	Select appropriate machine learning models, train them effectively, interpret their representations, and evaluate their performance using suitable metrics.	U, E	PO1, PO2, PO3, PO9, PO10
3	Apply feature engineering techniques, including feature transformation and feature subset selection, to improve the performance and interpretability of machine learning models.	A	PO1, PO2, PO4, PO10

Number of COs		4	
CO No.	Expected Course Outcome	Learning Domains *	PO No
4	Use probability and statistical methods such as discrete distributions, sampling distributions, hypothesis testing, and Monte Carlo approximation to analyze and support machine learning models.	A	PO1, PO2, PO3, PO10

*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	2	3	1	1	-	-	-	-	-	3
CO 2	3	3	2	-	-	-	-	-	1	2
CO 3	3	3	-	1	-	-	-	-	-	2
CO 4	3	2	1	-	-	-	-	-	-	2

'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	Introduction to Machine Learning and Data Preprocessing			
	1.1	Introduction to Machine Learning, Types of Machine Learning	3	["1"]
	1.2	Applications of Machine Learning, Tools in Machine learning, Issues in Machine learning	3	["1"]
	1.3	Basic Types of Data in Machine Learning ,Exploring the Structure of Data, Data Quality and Remediation, Data Pre-Processing	5	["1"]
2	Model Building, Training, and Evaluation			
	2.1	Selecting a model, Training a model	6	["2"]
	2.2	Model representation and interpretability	6	["2"]
	2.3	Evaluating performance of a model	5	["2"]
3	Feature Engineering Techniques			
	3.1	Basics of Feature Engineering	6	["3"]
	3.2	Feature transformation	5	["3"]
	3.3	Feature subset selection	6	["3"]
4	Statistical Foundations for Machine Learning			
	4.1	Importance of statistical tools in machine learning	4	["4"]
	4.2	Some common discrete distributions	4	["4"]
	4.3	Multiple random variables, Sampling distributions	3	["4"]
	4.4	Hypothesis testing, Monte carlo approximation	4	["4"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lecture, Activity oriented
---------------------------------------	--

Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Module Tests, Quiz or Viva, Assignment or seminar
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods – 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 ◦ Short answer - (5 out of 8) - $5 \times 2 = 10$ ◦ PART - B ◦ Short Essays - (5 out of 8) - $5 \times 6 = 30$ ◦ PART - C ◦ Essays - (3 out of 6) - $3 \times 10 = 30$

References

- Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, First Edition, Pearson India, 2020.(Module 1 - Chapters 1, 2; Module 2 - Chapter 3; Module 3 - Chapter 4; Module 4 - Chapter 5)

Suggested Readings

- Ethem Alpaydin "Introduction to Machine Learning, MIT Press
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (3rd ed.). O'Reilly Media.
- Machine Learning with PyTorch and Scikit-Learn: Develop machine learning and deep learning models with Python, Sebastian Raschka, Yuxi Liu, and Vahid Mirjalili
- Bharti Motwani, Data Analytics using Python, First edition, Wiley India Pvt. Ltd., 2020
- Reema Thareja, Data Science and Machine Learning using Python, Oxford University Press, 2020.
- Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, First edition, Cambridge University Press, 2020.

Affidavit

- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.
- We, SSV College, Valayanchirangara P.O, Perumbavoor, agree to appoint a new course coordinator for the proposed Artificial Intelligence and Machine Learning with Data Science 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 specialization, for as long as the college offers this programme.
- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, 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.

DRAFT



MAHATMA GANDHI UNIVERSITY

Kottayam, Kerala

Undergraduate Programmes (HONOURS)
2026 Admission Onwards

SYLLABUS

SIGNATURE COURSE

Name of the College	SSV College, Valayanchirangara P.O, Perumbavoor		
Faculty/ Discipline	Mathematics		
Programme	BSc (Hons) Mathematics		
Course Coordinator	Remya Radhakrishnan		
Contributors	Dr. Jebin Jacob		
Course Name	STATISTICAL AND ADVANCED MACHINE LEARNING		
Type of Course	DSE		
Specialization title	Artificial Intelligence and Machine Learning with Data Science		
Course Code	MG5DSEMATA05		
Course Level	300		
Course Summary	This course introduces the fundamental principles of Deep Learning and its relationship with probabilistic and machine learning methods. It begins with Bayesian concept learning, Bayes' theorem, and Bayesian belief networks to establish a probabilistic foundation. The course then covers supervised learning techniques for classification and regression, along with commonly used algorithms. Unsupervised learning methods, including clustering and association rule mining, are discussed for pattern discovery. The final module focuses on neural networks, covering biological and artificial neurons, activation functions, network architectures, learning processes, backpropagation, and an introduction to deep learning models. The course provides a conceptual and applied understanding suitable for mathematics and computing students.		
Semester	5	Credits	4
Course Details	Learning Approach	Lecture	Total Hours
	Credits	4	60
Pre-requisites, if any			

Course Outcomes (CO)

Number of COs		4	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain Bayesian concept learning, Bayes' theorem, and Bayesian belief networks, and apply probabilistic reasoning to concept learning problems.	U, A	PO1, PO2, PO3, PO4, PO10
2	Apply supervised learning techniques for classification and regression, and analyze the performance of commonly used algorithms.	A	PO1, PO2, PO3, PO4, PO5, PO9, PO10
3	Use unsupervised learning methods such as clustering and association rule mining to discover patterns and structures in data.	A	PO1, PO2, PO3, PO4, PO5, PO9, PO10

Number of COs		4	
CO No.	Expected Course Outcome	Learning Domains *	PO No
4	Describe the structure and functioning of biological and artificial neurons, explain neural network architectures and learning processes, and apply backpropagation concepts in deep learning models.	A	PO1, PO2, PO3, PO4, PO5, PO9, PO10

*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	3	2	1	-	-	-	-	-	2
CO 2	3	3	2	2	1	-	-	-	1	2
CO 3	3	3	2	1	1	-	-	-	1	2
CO 4	3	3	2	1	1	-	-	-	1	2

'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	Bayesian Learning and Probabilistic Models			
	1.1	Bayesian Concept Learning	4	["1"]
	1.2	Bayes' theorem	2	["1"]
	1.3	Bayes' theorem and concept learning	4	["1"]
	1.4	Bayesian belief network	5	["1"]
2	Supervised Learning: Classification and Regression			
	2.1	Supervised Learning: Classification	4	["2"]
	2.2	Common classification algorithms	5	["2"]
	2.3	Supervised Learning: Regression	3	["2"]
	2.4	Common regression algorithms	3	["2"]
3	Unsupervised Learning and Pattern Discovery			
	3.1	Unsupervised Learning	5	["3"]
	3.2	Clustering	5	["3"]
	3.3	Finding pattern using association rule	5	["3"]

Module	Units	Course Description	Hrs	CO No.
4	Neural Networks and Deep Learning			
	4.1	Understanding the biological neuron, Exploring the artificial neuron	4	["4"]
	4.2	Types of activation functions, Early implementations of ANN	4	["4"]
	4.3	Architectures of neural network, Learning process in ANN	4	["4"]
	4.4	Back propagation, Deep learning	3	["4"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction)
	Lecture

Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Module Tests, Quiz or Viva, Assignment or seminar
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods - 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 ◦ Short answer - (5 out of 8) - $5 \times 2 = 10$ ◦ PART - B ◦ Short Essays - (5 out of 8) - $5 \times 6 = 30$ ◦ PART - C ◦ Essays - (3 out of 6) - $3 \times 10 = 30$

References

- Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, First Edition, Pearson India, 2020.(Module 1 - Chapters 6,7; Module 2 - Chapter 8; Module 3 - Chapter 9; Module 4 - Chapter 10)

Suggested Readings

- Ethem Alpaydin "Introduction to Machine Learning, MIT Press
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (3rd ed.). O'Reilly Media.
- Machine Learning with PyTorch and Scikit-Learn: Develop machine learning and deep learning models with Python, Sebastian Raschka, Yuxi Liu, and Vahid Mirjalili
- Bharti Motwani, Data Analytics using Python, First edition, Wiley India Pvt. Ltd., 2020
- Reema Thareja, Data Science and Machine Learning using Python, Oxford University Press, 2020.
- Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, First edition, Cambridge University Press, 2020.

Affidavit

- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.
- We, SSV College, Valayanchirangara P.O, Perumbavoor, agree to appoint a new course coordinator for the proposed Artificial Intelligence and Machine Learning with Data Science 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 specialization, for as long as the college offers this programme.
- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, 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.

DRAFT

	MAHATMA GANDHI UNIVERSITY Kottayam, Kerala Undergraduate Programmes (HONOURS) 2026 Admission Onwards
---	---

SYLLABUS			
SIGNATURE COURSE			
Name of the College	SSV College, Valayanchirangara P.O, Perumbavoor		
Faculty/ Discipline	Mathematics		
Programme	BSc (Hons) Mathematics		
Course Coordinator	Remya Radhakrishnan		
Contributors	Dr. Jebin Jacob		
Course Name	PYTHON FOR DATA SCIENCE		
Type of Course	DSE		
Specialization title	Artificial Intelligence and Machine Learning with Data Science		
Course Code	MG6DSEMATA05		
Course Level	300		
Course Summary	This course introduces the core concepts and practical techniques of Data Science, covering fundamentals, Big Data characteristics, and data analytics tools. It guides students through the complete data science process, including problem formulation, data collection, preprocessing, and exploratory data analysis (EDA). Emphasis is placed on data cleaning, handling missing data, and identifying patterns through statistical and visualization methods. The course also develops skills in model building and result presentation. Practical components include the use of Python libraries such as NumPy, Pandas, and Matplotlib for data manipulation, analysis, and visualization, enabling students to build data-driven applications and gain hands-on experience.		
Semester	6	Credits	4
Course Details	Learning Approach	Lecture	Total Hours
	Credits	4	60
Pre-requisites, if any			

Course Outcomes (CO)

Number of COs		6	
CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the need for Data Science, its benefits, uses, and various facets of data.	U	PO1, PO2, PO3
2	Explain the Data Science process including research goal setting, data collection, cleaning, integration, and transformation.	U	PO2, PO3, PO4
3	Apply exploratory data analysis techniques and build basic data-driven models.	A	PO2, PO3, PO5
4	Explain methods for presenting results and developing data-driven applications.	A	PO2, PO3, PO9

Number of COs		6	
CO No.	Expected Course Outcome	Learning Domains *	PO No
5	Use NumPy and Pandas for data manipulation, analysis, indexing, and aggregation.	A	PO3, PO9, PO10
6	Develop data visualizations using Matplotlib and interpret graphical results.	A	PO1, PO2, PO3, PO10

*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	2	2	1	-	-	-	-	-	-	-
CO 2	-	3	1	1	-	-	-	-	-	-
CO 3	-	3	2	-	1	-	-	-	-	-
CO 4	-	2	1	-	-	-	-	-	1	-
CO 5	-	-	2	-	-	-	-	-	1	3
CO 6	2	2	1	-	-	-	-	-	-	2

'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	Data Science Fundamentals and Big Data Concepts			
	1.1	Data Science – Fundamentals and Components – Data Scientist – Terminologies Used in Big Data Environments – Types of Digital Data – Classification of Digital Data	7	["1"]
	1.2	Introduction to Big Data – Characteristics of Data – Big Data Analytics – Classification Evolution of Big Data of Analytics – Top Challenges Facing Big Data – Importance of Big Data Analytics – Data Analytics Tools.	8	["2"]
2	Data Science Process			
	2.1	Setting the Research Goal – Problem formulation – Retrieving Data from various sources	3	["2"]
	2.2	Data Preprocessing – Data Cleansing, Integration and Transformation – Handling missing data	4	["2"]
	2.3	Exploratory Data Analysis (EDA) – Descriptive statistics, visualization basics – Identifying patterns and trends	4	["3"]
	2.4	Model Building and Presentation – Basic model concepts – Presenting results – Building data-driven applications	4	["3", "4"]

Module	Units	Course Description	Hrs	CO No.
3	Data Analysis using NumPy and Pandas			
	3.1	Basics of Numpy arrays, aggregations, computations on arrays, comparisons, structured arrays	4	["5"]
	3.2	Data manipulation, data indexing and selection, operating on data, missing data,	6	["5"]
	3.3	Hierarchical indexing, combining datasets –aggregation and grouping, pivot tables.	6	["5"]
4	Data Visualization using Matplotlib			
	4.1	Visualization with matplotlib, line plots, scatter plots, visualizing errors, density and contour plots,	7	["6"]
	4.2	histograms, binnings, and density, three dimensional plotting, geographic data.	7	["6"]

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Lecture, Live coding demonstrations, exercises and problem-solving sessions
---------------------------------------	---

Assessment Types	MODE OF ASSESSMENT Mode of Assessment: Theory
	A. Continuous Comprehensive Assessment (CCA) • Theory - 30 Marks Module Tests, Quiz or Viva, Assignment or seminar
	B. End Semester Evaluation (ESE) • Theory - 70 Marks Assessment Methods – 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 ◦ Short answer - (5 out of 8) – 5 × 2 = 10 ◦ PART - B ◦ Short Essays - (5 out of 8) – 5 × 6 = 30 ◦ PART - C ◦ Essays - (3 out of 6) – 3 × 10 = 30

References

- 1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016.(Module 1- Chapter 1 ,Module 2- Chapter 2)
- Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Module 3-Chapter 3;Module 4-Chapter 4)

Suggested Readings

- DT Editorial Services. (2015). Big Data, Black Book, 1st Edition Dream Tech Press.
- Frank Pane. (2017). Hands on Data Science and Python Machin Learning, 1st Edition Packt Publishers.
- Yuxi (Hayden) Liu. (2017). Python Machine Learning by Example, 2nd Edition, Packt Publication.
- Alberto Boschetti and Luca Massaron, (2016). Python Data Science Essentials, 2nd Edition, Packt Publishers.

Affidavit

- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, retain the copyright of this syllabus and expressly prohibit its distribution in complete form to any institution outside our own.
- We, SSV College, Valayanchirangara P.O, Perumbavoor, agree to appoint a new course coordinator for the proposed Artificial Intelligence and Machine Learning with Data Science 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 specialization, for as long as the college offers this programme.
- We, SSV College, Valayanchirangara P.O, Perumbavoor and Remya Radhakrishnan, 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.

DRAFT