



ವಿಶ್ವವಿದ್ಯಾರಣ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ

“ವಿ ಟಿ ಯು ಅಧಿನಿಯಮ ೧೯೯೪” ರ ಅಡಿಯಲ್ಲಿ, ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ

Visvesvaraya Technological University

(State University of Government of Karnataka Established as per the VTU Act, 1994)

“Jnana Sangama” Belagavi-590018, Karnataka, India



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Ref. No.: VTU/BOS/A12/2024-25/5669

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Circular

Sub: Updated Syllabus of MCS102 (Data Science & Management)

- Ref: 1) Circular No. VTU/BGM/BoS/MCS101/691/2024-25 dated 5602 dated 29-01-2025
2) Feedback from concerned different engineering colleges
3) Recommendations from University BOS Chairperon, CSE/ISE/MCA dated

With reference to the above, this is to inform you that based on the feedback received from concerned different engineering colleges and as per the recommendations from the University BOS Chairperon, CSE/ISE/MCA, it is informed to follow the existing Syllabus available on the website for the subject MCS102 – Data Science & Management (1st Semester common course for all PG Programmes under CSE Board).

You are hereby requested to bring the contents of this Circular to the notice of all the concerned faculty members/students of your college and inform them to follow the same.

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03/02/25
Registrar
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To

- 1) The Principals of all Engineering Colleges (Constituent, Non Autonomous and Autonomous) under VTU.
- 2) The Chairpersons/Programme Coordinators of all VTU PG Centres at Muddenhalli, Belagavi, Mysuru and Kalaburagi Regions.

Copy to:

- 1) The Registrar (Eval.), VTU, Belagavi.
- 2) The Regional Director (I/c), VTU Regional Offices at Bengaluru, Belagavi, Kalaburagi & Mysuru for information and circulation.
- 3) The Secretary to VC, VTU, Belagavi.
- 4) PS to Registrar, VTU, Belagavi.
- 5) Director, NAAC, VTU, Belagavi.

Data Science and Management			
Course Code	MCS102	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	4:0:2	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
1. Explain the foundational concepts of data science, including its history, significance, and the data science process.			
2. Apply statistical methods and data analysis techniques to interpret and draw insights from complex datasets.			
3. Implement various machine learning algorithms and assess their performance using appropriate evaluation metrics in real-world scenarios.			
4. Utilize data visualization tools and techniques to effectively communicate findings and insights to diverse audiences.			
Module-1			
Module 1: Introduction to Data Science and R Tool, Overview of Data Science Importance of Data Science in Engineering , Data Science Process , Data Types and Structures, Introduction to R Programming, Basic Data Manipulation in R, Simple programs using R. Introduction to RDBMS: Definition and Purpose of RDBMS Key Concepts: Tables, Rows, Columns, and Relationships, SQL Basics: SELECT, INSERT, UPDATE, DELETE Importance of RDBMS in Data Management for Data Science			
Teaching Learning Process	Chalk and talk/PPT/case study/web content		
Module-2			
Module 2: Linear Algebra for Data Science, Algebraic View, Vectors and Matrices, Product of Matrix & Vector, Rank and Null Space, Solutions of Over determined Equations, Pseudo inverse, Geometric View, Vectors and Distances, Projections, Eigenvalue Decomposition.			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-3			
Module 3: Statistical Foundations, Descriptive Statistics, Notion of Probability, Probability Distributions Understanding Univariate and Multivariate Normal Distributions, Mean, Variance, Covariance, and Covariance Matrix, Introduction to Hypothesis Testing, Confidence Intervals for Estimates.			
Teaching Learning Process	Chalk and talk/PPT/case study/web content		
Module-4			
Module 4: Optimization and Data Science Problem Solving, Introduction to Optimization Understanding Optimization Techniques, Typology of Data Science Problems, Solution Framework for Data Science Problems.			
Teaching Learning Process	Chalk and talk/PPT/case study/web content		
Module-5			

Module 5: Regression and Classification Techniques, Linear Regression , Simple Linear Regression and Assumptions, Multivariate Linear Regression, Model Assessment and Variable Importance, Subset Selection, Classification Techniques , Classification using Logistic Regression.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content
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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Three Unit Tests each of **20 Marks**
2. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.

Semester End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

1. "Python for Data Analysis" by Wes McKinney, 2nd Edition (2018)
2. "Data Science from Scratch: First Principles with Python" by Joel Grus, 2nd Edition (2019)

Reference Books:

1. "An Introduction to Statistical Learning" by Gareth James, Daniela Witten, Trevor Hastie, and Robert Toshigami, 2nd Edition (2021)
2. "The Elements of Statistical Learning" by Trevor Hastie, Robert Toshigami, and Jerome Friedman, 2nd Edition (2009)
3. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett, 2nd Edition (2013)

Web links and Video Lectures (e-Resources):

- <https://www.coursera.org/specializations/jhu-data-science>
- <https://www.kaggle.com/learn/data-science>
- <https://www.edx.org/professional-certificate/harvardx-data-science>
- <https://www.youtube.com/playlist?list=PL4cUxeGkcC9g1s4L6G8p8Fq5XK6Pq7b1k>

Sl. No.	Description	
1	Demonstrate the ability to independently conduct research and development work to address practical engineering problems.	PO1
2	Develop and deliver comprehensive technical presentations that effectively convey complex information to diverse audiences.	PO2
3	Exhibit mastery in the specialized study area, surpassing the requirements of a relevant bachelor's program.	PO3
4	Analyze engineering problems critically and apply appropriate techniques, skills, and modern tools to develop innovative solutions.	PO4
5	Collaborate effectively in teams while also functioning independently, recognizing opportunities for career advancement and research.	PO5
6	Cultivate a proactive approach to continuous learning and professional development in response to evolving technological landscapes.	PO6

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

Sl. No.	Description	Blooms Level
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Mapping of COS and Pos		PO1	PO2	PO3	PO4	PO5	PO6
	CO1	x			x		
	CO2			x		x	
	CO3		x				
	CO4	x					

CO1	Explore the foundational concepts of data science, history, significance, and process.	L3
CO2	Apply statistical methods and data analysis techniques to interpret and draw insights from complex datasets.	L3
CO3	Implement various machine learning algorithms and assess their performance using appropriate evaluation metrics in real-world scenarios.	L2
CO4	Utilize data visualization tools and techniques to effectively communicate findings and insights to diverse audiences.	L4