

Academic Council: 26/07/2019

Item No: 4.76

UNIVERSITY OF MUMBAI



Syllabus for M.Sc. Part I
(Semester I and II)

Programme: M.Sc.

Subject: Information Technology

(Choice Based Credit System with effect from
the academic year 2019 – 2020)

Semester – I		
Course Code	Course Title	Credits
PSIT101	Research in Computing	4
PSIT102	Data Science	4
PSIT103	Cloud Computing	4
PSIT104	Soft Computing Techniques	4
PSIT1P1	Research in Computing Practical	2
PSIT1P2	Data Science Practical	2
PSIT1P3	Cloud Computing Practical	2
PSIT1P4	Soft Computing Techniques Practical	2
Total Credits		24

Semester – II		
Course Code	Course Title	Credits
PSIT201	Big Data Analytics	4
PSIT202	Modern Networking	4
PSIT203	Microservices Architecture	4
PSIT204	Image Processing	4
PSIT2P1	Big Data Analytics Practical	2
PSIT2P2	Modern Networking Practical	2
PSIT2P3	Microservices Architecture Practical	2
PSIT2P4	Image Processing Practical	2
Total Credits		24

Program Specific Outcomes

PSO1: Ability to apply the knowledge of Information Technology with recent trends aligned with research and industry.

PSO2: Ability to apply IT in the field of Computational Research, Soft Computing, Big Data Analytics, Data Science, Image Processing, Artificial Intelligence, Networking and Cloud Computing.

PSO3: Ability to provide socially acceptable technical solutions in the domains of Information Security, Machine Learning, Internet of Things and Embedded System, Infrastructure Services as specializations.

PSO4: Ability to apply the knowledge of Intellectual Property Rights, Cyber Laws and Cyber Forensics and various standards in interest of National Security and Integrity along with IT Industry.

PSO5: Ability to write effective project reports, research publications and content development and to work in multidisciplinary environment in the context of changing technologies.

SEMESTER I

M. Sc (Information Technology)		Semester – I	
Course Name: Data Science		Course Code: PSIT102	
Periods per week 1 Period is 60 minutes	Lectures	4	
	Credits	4	
		Hours	Marks
Evaluation System	Theory Examination	2½	60
	Theory Internal	--	40

Objectives	<input type="checkbox"/> Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics. <input type="checkbox"/> Practice problem analysis and decision-making. <input type="checkbox"/> Gain practical, hands-on experience with statistics programming languages and big data tools through coursework and applied research experiences.
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Pre requisites	Basic understanding of statistics
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Unit	Details	Lectures
I	Data Science Technology Stack: Rapid Information Factory Ecosystem, Data Science Storage Tools, Data Lake, Data Vault, Data Warehouse Bus Matrix, Data Science Processing Tools ,Spark, Mesos, Akka , Cassandra, Kafka, Elastic Search, R ,Scala, Python, MQTT, The Future Layered Framework: Definition of Data Science Framework, Cross-Industry Standard Process for Data Mining (CRISP-DM), Homogeneous Ontology for Recursive Uniform Schema, The Top Layers of a Layered Framework, Layered Framework for High-Level Data Science and Engineering Business Layer: Business Layer, Engineering a Practical Business Layer Utility Layer: Basic Utility Design, Engineering a Practical Utility Layer	12
II	Three Management Layers: Operational Management Layer, Processing-Stream Definition and Management, Audit, Balance, and Control Layer, Balance, Control, Yoke Solution, Cause-and-Effect, Analysis System, Functional Layer, Data Science Process Retrieve Superstep : Data Lakes, Data Swamps, Training the Trainer Model, Understanding the Business Dynamics of the Data Lake, Actionable Business Knowledge from Data Lakes, Engineering a Practical Retrieve Superstep, Connecting to Other Data Sources,	12
III	Assess Superstep: Assess Superstep, Errors, Analysis of Data, Practical Actions, Engineering a Practical Assess Superstep,	12

IV	Process Superstep : Data Vault, Time-Person-Object-Location-Event Data Vault, Data Science Process, Data Science, Transform Superstep : Transform Superstep, Building a Data Warehouse, Transforming with Data Science, Hypothesis Testing, Overfitting and Underfitting, Precision-Recall, Cross-Validation Test.	12
V	Transform Superstep: Univariate Analysis, Bivariate Analysis, Multivariate Analysis, Linear Regression, Logistic Regression, Clustering Techniques, ANOVA, Principal Component Analysis (PCA), Decision Trees, Support Vector Machines, Networks, Clusters, and Grids, Data Mining, Pattern Recognition, Machine Learning, Bagging Data, Random Forests, Computer Vision (CV) , Natural Language Processing (NLP), Neural Networks, TensorFlow. Organize and Report Supersteps : Organize Superstep, Report Superstep, Graphics, Pictures, Showing the Difference	12

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Practical Data Science	Andreas François Vermeulen	Apress		2018
2.	Principles of Data Science	Sinan Ozdemir	PACKT		2016
3.	Data Science from Scratch	Joel Grus	O'Reilly		2015
4.	Data Science from Scratch first Principle in python	Joel Grus	Shroff Publishers		2017
5.	Experimental Design in Data science with Least Resources	N C Das	Shroff Publishers		2018

Evaluation Scheme

Internal Evaluation (40 Marks)

The internal assessment marks shall be awarded as follows:

1. **30 marks (Any one of the following):**
 - a. **Written Test or**
 - b. **SWAYAM (Advanced Course) of minimum 20 hours and certification exam completed or**
 - c. **NPTEL (Advanced Course) of minimum 20 hours and certification exam completed or**
 - d. **Valid International Certifications (Prometric, Pearson, Certiport, Coursera, Udemy and the like)**
 - e. **One certification marks shall be awarded one course only. For four courses, the students will have to complete four certifications.**

2. **10 marks**

The marks given out of 40 for publishing the research paper should be divided into four course and should awarded out of 10 in each of the four course.

- i. **Suggested format of Question paper of 30 marks for the written test.**

Q1.	Attempt <i>any two</i> of the following:	16
a.		
b.		
c.		
d.		
Q2.	Attempt <i>any two</i> of the following:	14
a.		
b.		
c.		
d.		

- ii. **10 marks from every course coming to a total of 40 marks, shall be awarded on publishing of research paper in UGC approved Journal with plagiarism less than 10%. The marks can be awarded as per the impact factor of the journal, quality of the paper, importance of the contents published, social value.**

External Examination: (60 marks)

All questions are compulsory		
Q1	(Based on Unit 1) Attempt <u>any two</u> of the following:	12
a.		
b.		
c.		
d.		
Q2	(Based on Unit 2) Attempt <u>any two</u> of the following:	12
Q3	(Based on Unit 3) Attempt <u>any two</u> of the following:	12
Q4	(Based on Unit 4) Attempt <u>any two</u> of the following:	12
Q5	(Based on Unit 5) Attempt <u>any two</u> of the following:	12

Practical Evaluation (50 marks)

A Certified copy journal is essential to appear for the practical examination.

1.	Practical Question 1	20
2.	Practical Question 2	20
3.	Journal	5
4.	Viva Voce	5

OR

1.	Practical Question	40
2.	Journal	5
3.	Viva Voce	5