SHIVAJI UNIVERSITY, KOLHAPUR.

Accredited By NAAC with 'A' Grade
Revised Syllabus For

M. Phil./ Ph. D. Course Work

Computer Science

Syllabus to be implemented from
June, 2020 onwards.

A] Ordinance/Rules/Regulations:-

(as applicable to M.Phil. / Ph.D. programme)

B] Shivaji University,Kolhapur

New/Revised Syllabus For Course Work of M.Phil. / Ph.D. programme

1. TITLE: Subject **ComputerScience**

Optional/Compulsory under the Faculty of Science

2. YEAR OF IMPLEMENTATION:- New/Revised Syllabus will be implemented from **June 2020-21**onwards.

3.PREAMBLE:-The M.Phil. / Ph.D course work shall involve Three Papers Viz.

i) ResearchMethodology

ii) Resent Trends in ComputerScience

iii) Futuristic Technologies in Computer Science

Duration:-The M.Phil. programme shall be a full time regular course. The duration of M.Phil. programme shall be of two years.

4. PATTERN:-Pattern of Examination will be annual in respect of M.Phil/Ph.D.

FEE STRUCTURE:- (as applicable to regular/self supporting course): NA

i) Entrance Examination Fee(If applicable)–Rs____(Non-refundable)

ii) CourseFee.

Particulars	Rupees
Tuition Fee	
Laboratory Fee	
Internet Fee	
Library Fee	
Annual/Semester Fee per student	

5. ELIGIBILITY FOR ADMISSION:-

As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

6. MEDIUM OFINSTRUCTIONS:-

The medium of instruction shall be in English

STRUCTURE OF THE COURSE WORK FOR M.Phil/Ph.D. (No. of papers THREE)

Sr. No.	Subject/Papers	Marks
1	Research Methodology	100
2	Recent Trends in Computer Science	100
3	Futuristic Technologies in Computer Science	100
	Total	300

7. SCHEME OF TEACHING ANDEXAMINATION:-

Sr. No.	Subject/Papers (Hrs/week)				Examination scheme		
	L	T	P	Total	Theory	Term work	Total
1	4	---	---	4	100	---	100
2	4	---	---	4	100	---	100
3	3	1	---	4	80	20	100

8. SCHEME OFEXAMINATION:-

i) The examination shall be conducted at the end of each term/each academic year.

ii) The Theory paper shall carry 100marks

iii) The evaluation of the performance of the students in the theory papers shall be on the basis of Annual Examination of 100marks.

iv) Question Paper will be set in the view of the / in accordance with the entire Syllabus and preferably covering each unit of syllabi.

9. STANDARD OFPASSING:-

As prescribed under rules and regulation for each degree/program.

10. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:-

1. The question papers of papers I and II will consist of 100 marks and will have 8questions each of 20 marks. Five out of eight questions are to beattempted.
2. Question paper for paper III will be for 80 marks having 6 questions each of 20 marks on each unit. Each question will carry two sub questions. Out of total 6 questions Four questions are to be attempted. Nature of question paper is attached as separate sheet.
3. 20 marks are reserved for a seminar. A student is expected to review a research paper in Computer Science, published during last five years in national or International Journal of repute. The candidate should give seminar on the review of the selected paper. The research paper preferably should be related to the topic of research.

11. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISEDSYLLABUS)

Sr. No.	Title of the Old Papers	Title of the New Papers
1	Recent Trends in Computer Science	Two more chances be given for the old candidate
2	Research Trends in Computer Science	Two more chances be given for the old candidate

12. SPECIAL INSTRUCTIONS, IFANY

Paper-I

Title of the Paper: Research Methodology

UNIT-I **(15 Hrs)**

RESEARCH METHODOLOGY: An Introduction**,**Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Research Method versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, problem Encountered by Researchers in India. **Defining the Research Problem:** Definition of ResearchProblem, Selecting the Problem, Necessity of Defining the Problem Technique Involved in Defining aProblem

UNIT-II **(15 Hrs)**

MEASUREMENT AND SCALING TECHNIQUE: Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques. **Processing and Analysis of Data:** Processing Operations, Some Problems in Processing, Elements /Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion Measures of Asymmetry (Skewness), Measures of Relationship, Partial Correlation, Association in case of Attributes,Other Measures.

UNIT-III **(15 Hrs)**

SAMPLING FUNDAMENTALS: Need for Sampling, Some Fundamental Definitions, Central Limit Theorem, Sampling Theorem, Sandler's A-test, Concept of Standard Error, Estimation, Estimating the Population Mean, Estimating the Population Proportion, Sample size and its Determination, Determination of Sample Size through the Approach, Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach, Based on Bayesian Statistics. **Analysis of variance and covariance**: Analysis of variance(ANOVA), basic principles, technique, setting up analysis of variance table, short cut method for one- way ANOVA, coding method, two-way-ANOVA, ANOVA in Latin- Square-Design, Analysis of Co-variance(ANOCOVA), technique, assumption inANOCOVA.

UNIT-IV **(15 Hrs)**

INTERPRETATION AND REPORT WRITING: Meaning of Interpretation, Technique of Interpretation: Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing a Research Report.

Reference Books:

1. Kothari C.R. (reprint 2011), Research Methodology – Methods and Techniques (New Age International , NewDelhi)
2. Montgomery, Douglas C. (2007), Design and Analysis of Experiments.(WilleyIndia)
3. Montgomery, Douglas C. &Runger, George C. , Applied Statistics& Probability for Engineers (WileyIndia)
4. Krishnaswamy, K.N. Sivkumar , AppaIyer and Mathiranjan M.(2006), Management Research Methodology: Integration of Principles, Method and Techniques (Pearson Education, NewDelhi)

Paper-II

Title of the Paper: Recent Trends in Computer Science

UNIT-I **(15 Hrs)**

ARTIFICIAL INTELLIGENCE: Natural Language Processing (NLP), Chatbots & Conversational AI, Computer Vision, Ethics & Safety, Robotics, Machine Learning, Deep Learning, Reinforcement Learning, Generative Models

UNIT-II **(15 Hrs)**

MOBILE TECHNOLOGY: Conducting research on Mobile devices, RepeatabilityControlling the platform, Optimization for mobile computing, Mobile sensor integration, Mobile device research in limited environments, Ubiquitous computing, Augmented reality on mobile devices

UNIT-III **(15 Hrs)**

CLOUD COMPUTING: Clouds - General Benefits and Architecture, Business Drivers, Main players in the Field, Overview of Security Issues, MapReduce, key-value/NoSQL stores, classical distributed algorithms, widely-used distributed algorithms, scalability, trending areas,

UNIT-IV **(15 Hrs)**

BIG DATA ANALYTICS:Big Data Platforms and Data Storage, Big Data Analytics Algorithms, Linked Big Data Analytics, Graph Database and Analytics, Streaming Big Data Analytics, Big Data Visualization, Big Data Analytics for AI Finance, Big Data Analytics for AI Healthcare

References:

1. Research papers from ACM SIGCHI, IEEE MASS, IEEE Transactions on Mobile Computing, as well as other journal and conference papers.
2. Recent Trends and Advances in Artificial Intelligence and Internet of Things
3. Editors: Balas, Valentina E., Kumar, Raghvendra, Srivastava, Rajshree (Eds.), Springer Publishers
4. The CAPTCHA, Perspectives and Challenges: Perspectives and Challenges in Artificial Intelligence, by Darko Brodić, Alessia Amelio, Springer
5. Cloud Computing: Concepts, Technology & Architecture (The Pearson Service Technology Series from Thomas Erl) 1st Edition, by Thomas Erl , Ricardo Puttini , Zaigham Mahmood
6. Big Data Analytics Methods Analytics Techniques in Data Mining, Deep Learning and Natural Language Processing, by Peter Ghavami

Paper-III

Title of thePaper:Futuristic Technologies in Computer Science

UNIT-I **(15 Hrs)**

BLOCK CHAIN& APPLICATIONS: Research Aspects of Blockchain: Algorand,Cross Fault Tolerance, Secured Multi-Party Computation, Consensus Scalability, Bitcoin-NG, Collective Signing, Byzcoin. Blockchain for Science**:** Blockchain for Big Data, Blockchain and AI, Blockchain Applications in Financial Service, Supply Chain, Government, Other Industries

UNIT-II **(15 Hrs)**

INTERNET OF THINGS: IoT architecture modalities; IoT analytics, machine learning and data mining for IoT, Predictive Analytics and Deep learning, Complex Event processing, IoT analytics platforms (including AWS, Microsoft & Google offerings), Edge/Fog analytics, Applications in Industry4.0 and smart cities, steam reasoning and analytics, IoT innovations and open problems.

UNIT-III **(15 Hrs)**

DATA SCIENCE INCYBER SECURITY:AI for Cyber security, Detecting cyber threats using AI, Network anomaly detection using AI, Fraud prevention using Cloud AI solutions, ML and DL techniques for knocking Captcha, SPAM detection and prevention, vulnerability analysis, Case studies using open data sets

UNIT-IV **(15 Hrs)VIRTUAL REALITY**: Designing and Developing 3D User Interfaces: Strategies for Designing and Developing Guidelines and Evaluation. Advances in 3D User Interfaces: 3D User Interfaces for the Real World, AR Interfaces as 3D Data Browsers, 3D Augmented Reality Interfaces, Augmented Surfaces and Tangible Interfaces, Agents in AR, Transitional AR-VR Interfaces - The future of 3D User Interfaces, 3D Interaction Techniques, 3D UI Design and Development.

UNIT-V **(15 Hrs)**

EDGE COMPUTING: Introduction and working , Edge Architecture: CloudPath: A Multi-Tier Cloud Computing Framework, Cloud4Home: Enhancing Data Services with @Home Clouds, Femto Clouds: Leveraging Mobile Devices to Provide Cloud Service at the Edge, Fast, Scalable and Secure On loading of Edge Functions Using AirBox, entities and protocols used for edge computing, limitations: computing, memory, communication, power, and energy limitations, that will influence future edge developments, security and privacy issues in Edge computing. Fog Computing.

UNIT-VI **(15 Hrs)**

SOCIAL NETWORKS ANALYTICS: Extraction And Mining Communities In Web Social Networks: Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities. Case study.

References:

UNIT-I:

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos
2. Blockchain by Melanie Swa, O'Reilly
3. Hyperledger Fabric - https://www.hyperledger.org/projects/fabric
4. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html
5. Hands-On Blockchain with HyperledgerPublisher: https://www.packtpub.com/big-data-and-business-intelligence/hands-blockchain-hyperledgerAmazon (Kindle and Paperback): https://www.amazon.com/Hands-Blockchain-Hyperledger-decentralized-applications/dp/1788994523Public github repository with code samples: https://github.com/HyperledgerHandsOn/trade-finance-logistics

UNIT-II:

1. Analytics for the Internet of Things (IoT), by Andrew Minteer, Packt Publishing
2. Building Blocks for IoT AnalyticsInternet-of-Things Analytics, John Soldatos, River Publishers

UNIT-III:

1. Hands-On Artificial Intelligence for Cybersecurity: Implement smart AI systems for preventing cyber attacks and detecting threats and network anomalies by Alessandro Parisi
2. Hands-On Machine Learning for Cybersecurity: Safeguard your system by making your machines intelligent using the Python ecosystem by Soma Halder, Sinan Ozdemir

UNIT-IV:

1. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009
2. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
3. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", AddisonWesley, USA, 2005.
4. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005.
5. Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology", Wiley Interscience, India, 2003.
6. John Vince, "Virtual Reality Systems", Addison Wesley, 1995.
7. Howard Rheingold, "Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society", Simon andSchuster, 1991.
8. William R Sherman and Alan B Craig, "Understanding Virtual Reality: Interface, Application and Design (The Morgan KaufmannSeries in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002.

UNIT-V:

1. http://sysweb.cs.toronto.edu/publication_files/0000/0309/sedgec17-final51.pdf
2. https://ieeexplore.ieee.org/document/5961767
3. https://ieeexplore.ieee.org/document/7214022

4. https://ieeexplore.ieee.org/document/7774350
5. https://link.springer.com/chapter/10.1007/978-3-319-05029-4_7

UNIT-VI:

1. Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.
3. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
4. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
5. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
6. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

M.Phil/ Pre. Ph. D. (Computer Science)

Paper-III:Futuristic Technologies in Computer Science

[Total Marks 80]

Instructions:

1. Attempt any Fourquestions.
2. All questions carry equalmarks.

Q.1.	a. UNIT I	[10]
	b. UNIT I	[10]
Q.2.	a. UNIT II	[10]
	b. UNIT II	[10]
Q.3.	a. UNIT III	[10]
	b. UNIT III	[10]
Q.4.	a. UNIT IV	[10]
	b. UNIT IV	[10]
Q.5.	a. UNIT V	[10]
	b. UNIT V	[10]
Q.6.	a. UNIT VI	[10]
	b. UNIT VI	[10]