

Program Syllabus Booklet

Doctor of Philosophy (Computer Applications)

(Ph.D.CA-381)



Session: 2018-19

**University College of Computer Applications
Guru Kashi University, Talwandi Sabo**



**GURU KASHI
UNIVERSITY**
PUNJAB - INDIA



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Program Name: Doctor of Philosophy (Computer Applications)

Program Code: 381

Program Outcome (PO): The Program Outcomes for the program Doctor of Philosophy (Computer Applications) are as follows:

PO	Statement
PO1	Computational knowledge: To understand and apply mathematical foundation, computing knowledge for the conceptualization of computing models from defined problems.
PO2	Problem analysis: Toability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.
PO3	Design/development of solutions: Toability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.
PO4	Conduct investigations of complex Computing problems: Toability to devise and conduct experiments, interpret data and provide well informed conclusions.
PO5	Modern tool usage: Toability to select modern computing tools, skills and techniques necessary for innovative software solutions.
PO6	Societal & Environmental Concern: Toability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practices.
PO7	Environment and sustainability: Tounderstand the impact of the professional programmer solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: To apply ethical principles and commit to professional ethics and responsibilities and norms of the computer practices.
PO9	Individual and team work: To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.



PO10	Communication: To communicate effectively on complex Computer activities with the Computer community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: To demonstrate knowledge and understanding of the programmer and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

The Program Specific Outcomes (PSOs): The PSO for the Doctor of Philosophy (Computer Applications) are as follows:

PSO	Statement
PSO1	To write a concrete research proposal by including appropriate research methodology for carrying out research.
PSO2	To carry out the latest research work in the chosen specialized area of Computer Science and further preparation of high-quality research related to the field of study using various methods and tools
PSO3	To actively participate in the development and growth of the field of Computer Science Applications at all levels in the IT industry or in research and teaching in a university or a research organization.

Course Work										
Study Scheme										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	180101	Research Methodology	T	4	0	0	4	50	50	100
2	Elective-I									
3	381101	Recent Advances in Computer Applications	T	4	0	0	4	50	50	100
4	381102	Seminar	P	NA	NA	NA	2	100	NA	100
Total No. of Credits				12 /15						

Elective-I (Select one of the following subject)

Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	180102	Computer Applications in Research	T/P	1	0	2	2	100	NA	100
2	180105	Statistical Methods	T	3	0	0	3	50	50	100

Course Name: Research Methodology

Course Code: 180101

Semester: 1st

Credits:-04

L T P

4 0 0

Course Outcomes: On successful completion of this course, the students will be able to

CO	Statement
CO1	Identify the role and importance of research in the Computer Applications.
CO2	Understand key research methodology concepts and issues
CO3	Identify the concepts and procedures of sampling, data collection, analysis and reporting.
CO4	Analyze appropriate research problem and parameters
CO5	Implement the basic concepts of research and its methodologies

CourseContents

(Common for Doctor of Philosophy in Engineering , Education, Applied Science, Management ,Computer Application, Commerce, Economics)

1) Research

Objectives of Research, Research Types, Research Methodology, Research Process – Flow chart, description of various steps, Selection of research problem.

2) Research Design

Meaning, Objectives and Strategies of research, different research designs, important experimental designs, Completely randomized, Randomized block, Latin Square, Factorial Experimental Design.

3) Methods of Data Collection

Types of data collection and classification, Observation method, Interview Method, Collection of data through Questionnaires, Schedules.

4) Processing and Analysis of Data:

Editing, Coding, Classification of data

Statistical measures and their significance: Central tendencies, Variation,

Skewness, Kurtosis, Correlation and Regression, Multiple Regression, Time Series Analysis, Parametric tests (t, z and F), Chi Square test, Analysis of Variance, One - way ANOVA Factor Analysis, Centroid Method, Computer simulations using MATLAB/SPSS.

5) Probability Distributions

Binomial, Poisson, Exponential, Normal distributions, Frequency distribution, Cumulative Frequency distribution, Relative Frequency distribution.

6) Sampling Methods:

Different methods of Sampling: Probability Sampling methods, Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling.
Non Probability Sampling methods, Sample size.

7) Testing of Hypotheses:

Testing of Hypotheses concerning Mean(s), Testing of Hypotheses concerning Proportion(s), Testing of Hypotheses concerning Variance(s)

8) Report Writing and Presentation:

Types of reports, Report Format –
Cover page, Introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation.

References:

1. Montgomery, Douglas C. (2007). *Design and Analysis of Experiments*. Wiley India.
2. Montgomery, Douglas C. & Runger, George C. (2003). *Applied Statistics & Probability for Engineers*. Wiley India.
3. Kothari C.K. (2004) *.Research Methodology- Methods and Techniques*, New Age International, New Delhi.
4. Krishnaswamy, K.N., Sivakumar, AppaIyer and Mathiranjani M. (2006). *Management Research Methodology; Integration of Principles, Methods and Techniques*. Pearson Education, New Delhi.
5. Chawla, Deepak, Sondhi, Neena. (2011). *Research Methodology Concepts and Cases*. Vikas Publishing House Pvt Ltd., New Delhi
6. Panneerselvam, R. (2014). *Research Methodology*. PHI. New Delhi.
7. Cooper, D.R., Schindler, P.S. (2000). *Business Research Methods*. Tata McGraw Hill.
8. Gupta S P. (2011). *Statistical Methods*. Sultan Chand & Sons, Delhi,
9. Ronald E Walpole. (2010). *Probability and Statistics for Engineers and Scientists*. International Edition, Pearson Education.

10. Chakravarty Pulak.(2017). *Quantitative Techniques for Management and Economics*. Himalaya Publishing House.

11..Tripathi P.C. (2007).*A Text Book of Research Methodology in Social Sciences*.Sultan Chand & Sons.

12. Bhattacharyya D.K.(2017).*Research Methods*. Sage Publications.

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	1	2	1	1	2	3	1	2	1	3	3	1
CO2	1	2	-	2	1	2	3	1	1	2	1	2	2	1	2
CO3	2	1	2	1	2	1	2	3	2	-	2	1	1	2	1
CO4	3	2	1	3	3	3	1	1	1	3	3	3	2	-	3
CO5	2	3	2	3	1	2	3	2	2	3	1	2	1	3	2
Average	1.8	2.2	1.6	2.0	1.4	1.8	2.	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8

The Correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Elective-I

Course Name: Computer Applications in Research

Course Code: 180102

Semester: 1st

Credits: 02

L T P

1 0 2

Course Outcomes: On successful completion of this course, the students will be able to

CO	Statement
CO1	Work effectively with a range of current, standard, Office Productivity software applications used in research.
CO2	Apply a variety of advanced spreadsheet, operating system and word processing functions, SPSS Tool.
CO3	Implement MATLAB tools for building applications and interfaces to carry out data analysis and presentations.
CO4	Identify the plagiarism using various Anti-Plagiarism Software.
CO5	Implement Reference Management Software for standard referencing styles like IEEE, MLA, APA etc.

CourseContents

CommonforallbranchesexceptHindi,Punjabi,English,HistoryandReligiousStudy

Unit1

Generating Charts/Graphs in Microsoft Excel, Power Point Presentation, and Web search, Use of Internet and www. Using search like Google etc.

Unit 2

SPSS concepts and its use for Statistical Analysis.

Unit 3

MatLaband its use for Statistical Analysis.

Unit 4

Introduction to the use of LaTeX, Mendeley, Anti-PlagiarismSoftwares .

References:



1. Kogent Solutions.2008. *Office 2007 in Simple Steps*. Dreamtech Press.
2. Jain S.2010. (2007).*MS-OfficeTraining Guide*. BPB Publications.
3. Bansal R. K., Goel Ashok Kumar, Sharma Manoj Kumar.(2016).*MATLAB and its applications in Engg*. Second Edition ,Pearson Education, Delhi.
4. Sabine handan& Brian S. Everitt. (2004).*A Handbook of Statistical Analysis using SPSS*. Chapman & Hall / CRC Publication, USA.

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PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	3	3	2	2	2	2	3	2	3	3	2	2
CO2	2	3	2	2	2	3	2	1	2	3	1	3	2	3	1
CO3	3	2	3	2	2	2	1	2	3	2	2	2	3	2	2
CO4	2	2	3	2	2	3	-	-	2	3	2	3	2	3	3
CO5	3	2	3	2	2	2	2	2	2	2	3	2	3	2	2
Average	2.4	2.2	2.6	2.2	2.2	2.4	1.8	1.8	2.2	2.6	2	2.6	2.6	2.4	2

The Correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation

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Elective-I

Course Name: Statistical Methods

Course Code: 180105

Semester: 1st

Credits: 02

L T P

1 0 2

Course Outcomes: On successful completion of this course, the students will be able to

CO	Statement
CO1	Designed, carried out and presented an original work of research at the leading edge of the statistics discipline.
CO2	Understand the basic theoretical and applied principles of statistics with adequate preparation to pursue a PhD or enter the job force as an applied statistician.
CO3	Summarize a technical report and/or statistical analysis and interpret results; also, show the ability for broader implication of application in the statistical field.
CO4	Gain proficiency in using statistical software for data analysis.
CO5	Pass the Comprehensive written exams based on a summary of required coursework.

Course Contents

Probability distribution: uniform, binomial, Poisson, geometric, hyper geometric, negative binomial, multinomial, normal, exponential, Cauchy, Gamma, Beta, Weibull, log normal, logistic and Pareto.

Compound and truncated distributions: Central and non-central z, t and F. Bivariate normal. Distribution of quadratic forms and r-the order statistic.

Practical: Random experiments. Moments, Correlation and regression, Fitting of binomial, Poisson, normal, hyper geometric and negative binomial, Truncated binomial and Poisson. Log norms.

The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	1	2	1	1	3	1	1	2	2
CO2	2	-	1	2	2	2	2	1	2	2	1	2	2	2	1
CO3	1	3	2	2	2	2	1	2	-	1	2	1	2	1	1
CO4	-	2	2	1	1	3	1	2	1	3	2	3	2	3	2
CO5	2	2	2	2	2	3	2	1	3	1	1	2	1	2	2
Average	1.5	2.3	1.8	1.8	1.6	2.2	1.4	1.6	1.8	1.6	1.8	1.8	1.6	2	1.6

The Correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Recent Advances in Computer Applications

Course Code: 381101

Semester: 1st

Credits:04

L T P

4 0 0

Course Outcomes: On successful completion of this course, the students will be able to

CO	Statement
CO1	Understand the specialized aspects of big data including big data application, and big data analytics.
CO2	Learn and able to work with different types Case studies on the research and applications of the Hadoop and big data in industry.
CO3	Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.
CO4	Get acquainted with in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications.
CO5	Understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity etc.

Course Contents

Group I

Introduction to IoT

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

Group-II

Introduction to Big Data

Big Data – Definition, Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and Methods - Analysis v/s Reporting - Modern Data Analytic Tools, Introduction to Hadoop.

Group-III

Image Processing Fundamentals

Introduction – Elements of visual perception, Steps in Image Processing Systems – Digital Imaging System - Image Acquisition – Sampling and Quantization – Pixel Relationships – File Formats – Colour images and models - Image Operations – Arithmetic, logical, statistical and spatial operations.

Group IV

Cloud Computing

Introduction to Cloud Computing- Evolution of Cloud Computing, Server Virtualization, Web Services Deliver from the Cloud- Communication-as-a-Service, Infrastructure- as-a-Service, Monitoring- as-a- Service, Platform- as-a-Service, Software- as-a-Service.

Generic Cloud Architecture Design – Layered cloud Architectural Development – Virtualization Support and Disaster Recovery – Architectural Design Challenges

Group V

Machine Learning & Deep Learning:

Introduction to machine learning- Linear models (SVMs and Perceptions, logistic regression)- Intro to Neural Nets: Shallow Neural Network- Training a network: loss functions, back propagation and stochastic gradient descent.

History of Deep Learning- A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks

References:

- 1.Hersent Olivier, Boswarthick David, Elloumi Omar. (2012).*The Internet of Things – Key Applications and Protocols*. Wiley
- 2.Cotton Richard, Learning R. (2013).*A Step-by-step Function Guide to Data Analysis*, O'Reilly Media.
- 3.Gonzalez Rafael C. and Woods Richard E. (2008).*Digital Image Processing*,Third Edition, Pearson Education, New Delhi
- 4.Velte Toby, Velte Anthony, Elsenpeter Robert, Cloud Computing.(2009). *A Practical Approach*. McGraw-Hill Osborne Media.
- 5.Nielsen Michael. (2015).*Neural Networks and Deep Learning*, Determination Press.

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PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	3	1	1	1	2	1	1	3	1	3	1	2
CO2	2	2	1	2	3	2	2	2	2	2	3	2	2	2	1
CO3	2	3	3	2	2	2	1	2	-	1	2	1	3	1	2
CO4	2	2	1	1	1	3	2	2	1	3	2	2	2	3	2
CO5	2	2	3	2	2	3	2	1	3	1	2	2	1	2	2
Average	1.8	2.2	2	2	1.8	2.2	1.6	1.8	1.8	1.6	2.4	1.6	2.2	1.8	1.8

The Correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.



Course Name: Seminar

Course Code: 381102

Semester: 1st

Credits: 02

L T P

0 0 0

Course Contents

Students will be given a topic related to recent trends in computer Software / Hardware and they will submit a report consisting of salient features about the topic. They will also prepare and submit PPT and deliver a seminar on the topic.

Total Number of Course	5
Number of Theory Course	4
Number of Practical Course	1
Total Number of Credits	12/15

Academic Instructions

Attendance Requirements

A student shall have to attend 75% of the scheduled periods in each course in a semester; otherwise he / she shall not be allowed to appear in that course in the University examination and shall be detained in the course(s). The University may condone attendance shortage in special circumstances (as specified by the Guru Kashi University authorities). A student detained in the course(s) would be allowed to appear in the subsequent university examination(s) only on having completed the attendance in the program, when the program is offered in a regular semester(s) or otherwise as per the rules

Assessment of a course

Each course shall be assessed out of 100 marks. The distribution of these 100 marks is given in subsequent sub sections (as applicable).

Components	Internal (50)					External (50)	Total	
	Attendance	Assignment			MST 1	MST2		ETE
		A1	A2	A3				
Weightage	10	10	10	10	30	30	50	
Average Weightage	10	10			30		50	100

Passing Criteria

The students have to pass both in internal and external examinations. The minimum passing marks to clear in examination is 40% of the total marks.