



Hemchandracharya North Gujarat University, Patan

PH.D. COURSE WORK SYLLABUS

SUBJECT : COMPUTER SCIENCE

Scheme & Course

Sr.	Paper	Nomenclature	Credits	Marks
1.	Paper-I-COMPUTER-CW-101	Research Methodology	04	70+30
2.	Paper-II-COMPUTER-CW-102	Network Security	04	70+30
3.	Paper-III-COMPUTER-CW-103	Computer Applications to the subject	04	70+30
4.	Paper-IV-COMPUTER-CW-104	Review of published research in the relevant field	04	70+30
5.	Paper-V-COMPUTER-CW-105	Comprehensive Viva	04	100

Notes:

1. The candidate has to obtain a minimum of 55% of marks or its equivalent grade points in aggregate in the course work in order to be eligible to continue in the Ph.D. programme.
2. If candidate obtains 'F' or 'Ab' grade in the course/ subject. He/ she will be treated to have failed in that course. He/ She has to reappear in the examination in the next semester.

Paper-I	COMPUTER-CW-101	Research Methodology	Credit-4	(70+30)
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- Unit -1** **Foundations of Research** : meaning, objectives, Motivation, Utility, Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method Understanding the language of research- Concept, Construct, Definition, Variable. Research Process Problem identification & Formulation- research Questions- Investigation Question-measurement Issues- Hypothesis- Qualities of a good Hypothesis-Null Hypothesis & Alternative Hypothesis. Hypothesis Testing- Logic & Importance.
- Unit -2** **Research Design** : Concept and importance in Research- Features of a good research design- Exploratory Research Design- concept, types and uses, descriptive Research design- concept, types and uses.
Experimental Design; Concept of Independent & Dependent variables. Qualitative and Quantitative Research; Qualitative research- Quantitative research- Concept of measurement, causality, generalization, replication. Merging the two approaches.
- Unit -3** **Measurement**: Concept of measurement- what is measured? Problems in measurement in research- Validity and Reliability. Levels of measurement- Nominal, Ordinal, interval, Ratio. Sampling ; Concepts of Statistical population, Sample, sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample Simple, random Systematic sample, Stratified Random Sample & multi-stage sampling. Determining size of the sample- practical considerations in sampling and sample size.
- Unit -4** **Data Analysis**: Data Preparation- Univariate analysis (Frequency tables, bar charts, pie charts, percentages), Bivariate analysis- Cross tabulations and Chi-square test including testing hypothesis of association. Interpretation of Data and Paper writing- Layout of a Research paper, Journals in Computer Science, Impact factor of journals, when and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.



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Unit -5 Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline. Use of tools/ techniques for Research : methods to search required information effectively, Reference management Software like Zotero/ mendeley,. Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

1. Business Research methods- Donalds-Donald Cooper & Pameta Schidler, TMGH, (th edition
2. Business Research methods- Alan Bryman & Emma Bell, Oxford University Press.
3. Research methodology-C.R.Kothari
4. S.S. Chandel, Umesh Kumar Sing and kailsh Phuleria, Research Methodology Tools ans Techniques, S.K. Bookagency, New Delhi.

Paper-II	COMPUTER -CW-102	Network Security	Credit-4 (70+30)
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UNIT-I Need of Security. Security approaches, principals of security, types of attacks, authentication basics, passwords, authentication tokens, certificate based authentications, biometric authentication, Kerberos.

UNIT-II Cryptographic techniques: Plain text and cipher text. substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric cryptography, overview of steganography, key range and key size, possible types of attacks.

UNIT-III Symmetric key algorithms: algorithm types and modes, Data Encryption Standard (DES). International Data Encryption Algorithm (IDEA), RCS, Blowfish, Advanced Encryption Algorithm (AES), Differential and Linear Cryptanalysis.

UNIT-IV Asymmetric Key Algorithm: History and overview of asymmetric key algorithms. RSA algorithm, Digital Signatures, Digital certificates, private key management. PK.IX model, Public Key Cryptography Standards (PKCS), XML, PKI and Security.

UNIT-V Internet Security Protocols: Secure Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL vs. SET, 3-D secure protocol, Electronic money, Email security, WAP security

Books:

1. Network Security and Cryptography, William Stalings.
2. Cryptography and Network Security, Atul Kahate.
3. Cryptography and Security, Shyamla, Harini and Padmanabhan, Wiley India.

Paper-III	COMPUTER-CW-103	Computer Applications to the subject	Credit-4 (70+30)
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UNIT-I

Using Computer: Importing and exporting of computer Data knowledge of pdf. and html formats, using notepad/word pd, MS Access and Adobe PageMAKER, Baic knowledge of Programming and data processing, Two dimensional and three dimensional plots, using Excel and origin for graphical representation and computation, using SPSS and Matlab, using interet and search engines, using powerpoint/ flash / video for making deliberations, Internet and Intranet: HTML, Web pages, Creating a web pages using MS Frontpage, adding graphics and Images, Current web technologies. Hosting a web site. Advance search techniques, case studies: Google & Yahoo and Google scholar, Building and intranet processing advance features helpful in preparing thesis in MS-Word.

UNIT -II

Data Analysis and Display : Facilities in MS Excel for Data analysis and display software, case study : Origin software for scientific and Statistical Analysis : Case studies : SPSS Database : Creating a Database and simple Querying Graphics and Drawing : Adobe Photoshop : basics (only Introductory level) Image compression GIF,JPEG,PNG formats), Multimedia, Digital Arts,Audio nad Video formats, Multimedia Projections.



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Educational and Research resources on Net: Encyclopedia case study: Wikipedia, Online Tutorials and Lectures, Java Applets, Educational Applets, Virtual Labs, Electronic Journals, E-books, Digital Libraries. Searching research information using J-gate, Scopus and resources. Written Communication: preparing and sending Emails, Letters, Presentation using visual aids and PowerPoint. IP address, Hypertext, Uniform Resource Locators, Web Browsers, Domain name, Internet Services Providers, Internet Security, Internet Requirement, Web Search Engine, net Surfing, Internet Service.

Security problem in Computing: Protecting variables-Characteristics of computer intrusion-attacks- security goals- vulnerabilities-Computer criminals- methods of defense Elements of cryptography: Terminology and background-Substitution ciphers-Transpositions-Encryption algorithms-data encryption standard-AES encryption algorithms- uses of encryption.

UNIT- V

Introduction of data representation and processing with XML : syntax-data representation well formed document- style sheets-XLS-Xlinks-Xpointers-XML Schema.

1. Information Communication Technology by Tim Shortis.
2. Handbook of Communication and social Interaction Skills By John.
3. Ajiawei Han and michelinekamber "Data Mining" Concepts and Techniques " Morgan Kaufman Publishers (Elsevier Science), 2001 (ISBN:81-7867-023-2)
4. William Staling "Crytography and network Security- Principles and Practices".
5. Prentice Hall (Persong Education) Fourth Edition 2006
6. Atulakhate, Cryptogrsphy and network security tata Mc graw Hill Publication New Delhi.
7. Elaine Rich and Kevin Knight "Artificial Intelligence" Tata mc-Graw Hill Edition, 2nd Edition 1995.
8. Eugene charniat and Drew Mc-Dermot "Introduction to Artificial Intelligence Addition Wesley, 1985."

For this paper candidates will have to review literature in an area of research, prepare a research proposal and submit a report to the University at the end of the course work. The selection of the problem and preparation of the proposal will be in consultation with research guide.

Candidate will face a Comprehensive Viva-Voce of 4 credits on the subject of Research Methodology, Network Security and literature review report submitted to the university. The Presentation will have to be made by the candidate and it will need to be prepared in consultation with research guide.



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