Course Title: Research Methodology for Computer Science **Credit: 3**

Course No: CSIT.323 **Number of period per week: 3+3**

Nature of the Course: Theory + Tutorial **Total hours: 45+45**

Year: Third, Semester: Sixth

Level: B. Sc. CSIT

1. Course Introduction

This course deals with the knowledge of research methods/techniques/project works in computer science. It covers the details of scientific approach of research, research design and types of research, measurements and scales, and data, sample designs, data analysis and research report presentation. This course also includes for preparing research reports and dissertations/thesis, writing academic paper for publication in the journal, and presentation of the research documents.

2. Objectives

The main objective of the course is to make students familiar with research methodologies/ techniques/project works in Computer Science. After completion of this course, the students will be able to carry out research /project works independently. The general objectives are to:

- introduce scientific approach of research
- familiar research design and different types of research
- introduce measurements and scales including measures of reliability, validity and generalizability.
- collect the data, prepare appropriate sample designs and sample plans and sample size for research.
- make able to write research documents (writing research proposal, grant proposal, thesis/ dissertation, report writing and academic paper writing for publication in the journal).

3. Specific Objectives and Contents

Specific Objectives	**Contents**
• To understand research methodologies/ techniques, project works. • To know the concept and nature of research, its process, objective, planning and formulation of research problems and hypotheses. • To understand the significance, application and characteristics, and generality and specificity of research problems along with the nature of multivariate research problems especially focused on computer science. • To know the concept of reviewing literature of related research work and preparing review notes and references/bibliographies in the research documents.	**Unit I: Scientific Approach of Research (5 Hrs)** **1.1 Basic concept of research:** Concept and nature of research activities, process of scientific investigation, objective of research, planning and formulation of hypotheses, statement of research problems and its significance, applications and characteristics, and generality and specificity of research problems, and multivariate nature of research problems focused on computer science and information technology. **1.2 Literature review**: Purposes of literature review, function and types of literature reviews, format of presenting the literature review, guidelines for conducting literature reviews, references/bibliographies in computer science.
• To understand the concept and meaning of research design, types and dimension of	**Unit II: Research Design (8 Hrs)** 2.1 Concept and meaning of research design, types and

research design, purposes and needs and principles of research design, function of research design and its process. • To develop a research plan, select a good, adequate and scientific research design. • To know the principles of experimental, quasi-experimental, and factorial research design for empirical research. • To know the elements, goals and logics of experimental research design.	dimension of research design, purposes and needs and principles of research design, function of research design and its process. 2.2 Developing a research plan, selecting a study design, criteria of good research design, adequate and inadequate research design, and scientific research design. 2.3 Experimental, quasi-experimental, and factorial research design for empirical research. 2.4 Elements, goals and logic of experimental design.
• To understand the meaning and concept of different types of research, especially scientific research, ex-post-facto research, historical research, experimental and laboratory research, field experimental research, action and participatory action research, evaluation, project and monitoring research, qualitative and quantitative research in computer science	**Unit III: Research Types (6)** 3.1 Basic concept of different types of research, scientific research, ex-post-facto research, historical research, experimental and laboratory research, field experimental research, action and participatory action research, evaluation, project and monitoring research, qualitative and quantitative research.
• To know the meaning of the variables and attributes in research. • To understand the concept of measurement scales, nominal, ordinal, interval and ratio scales, classification of scaling, standard score, σ, T and Percentile scores, sources of error in measurement. • To understand the reliability, validity, and generalizability and the relationship between reliability and validity. • To measure the reliability and validity, and also to estimate the test score.	**Unit IV: Measurements and Scales (8)** 4.1 Variables and attributes, concept of measurement scales, nominal, ordinal, interval and ratio scales, classification of scaling, scaling techniques, standard score, σ, T and Percentile scores, sources of error in measurement. 4.2 Concept of reliability, validity, and generalizability and their measures and tests, estimation of true score of the test, and relationship between reliability and validity.
• To know the sources of data and their collection using different methods. • To prepare sample designs, sample plans and selection of sample size for research, and also to check the validity of the collected data for research. • To organize and manage data and apply appropriate techniques for data analysis and tabulation and presentation of data.	**Unit V: Sample Designs and Data Analysis (6 Hrs)** 5.1 Data sources and data collection methods. 5.2 Sample designs, sample plans, selection of sample and validation of the data. 5.3 Organization and management of data, coding and decoding of data, data analysis techniques, tabulation and presentation of data.
• To understand the basic concept of writing research paper, thesis/dissertation, reports and their formats, typing of research documents and presentations of research. • To know writing research proposal and grant research proposal. • To able how to prepare research report/ project/monitoring/evaluation report. • To know how to prepare thesis/dissertation and academic research paper for publication in the journal.	**Unit VI: Research Writing & Presentation (12 Hrs)** 6.1 Basic concept of writing research paper, thesis/dissertation, reports and their formats. Typing of research documents and presentations of research findings. 6.2 Writing research proposal and grant research proposal. 6.3 Writing research report/project report/ monitoring/evaluation report. 6.4 Writing thesis/dissertation and prepare academic

• Able to prepare sample formats and examples of thesis/dissertation writing, report writing, proposal writing and research paper writing.	research paper for publication in the journal. 6.5 Prepare sample formats and examples of thesis/dissertation writing, report writing, proposal writing and research paper writing as the case study focusing on computer science.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weightage**	**Marks**	**Report**	**Weightage**	**Mark**
End semester examination	60	Assignments	20%	20	Preparation of some research document And presentation	100%	20
(Details are given in the separate table at the end)		Quizzes	10%				
		Attendance	20%				
		Internal Exams	50%				
Total External	60	Total Internal	100%	20		100%	20
Full Marks 60+20+20 = 100							

External evaluation

1. **End semester examination:**
   It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following grid.

2. **External Practical Evaluation:**
   After completing the end semester theoretical examination, practical examination will be held. External examiner will conduct the practical examination according to the above mentioned evaluation. There will be an internal examiner to assist the external examiner. Three hours time will be given for the practical examination. In this examination Students must demonstrate the knowledge of the subject matter.

Full Marks: 100, Pass Marks: 45, Time: 3 Hrs

Nature of question	**Total questions to be asked**	**Total questions to be answered**	**Total marks**	**Weightage**
Group A: multiple choice*	20	20	20×1 = 20	60%
Group B: Short answer type questions	7	6	6×8 = 48	60%
Group C: Long answer type questions	3	2	2×16 =32	60%
			100	100%

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.

Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.

Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Assignments
- Presentation by Students
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period. If a student fails to attend a formal exam/quiz/test, there won't be any provision for re-exam. Unless and until the student clears one semester he/she will not be allowed to study in the following semesters.

Report

Student needs to choose topic of their interest related to computer science and information technology and needs to prepare sample reports that include all concepts discussed in theory class. Finally presentation should be done in the presence of external examiner

Reference Materials

- Abbas, T. and Charles, T. (2002): Handbook of Mixed Methods in Social and Behavioral Research, Sage Publications .
- and *Procedures for Developing Grounded Theory,* Sage Publication
- Aryal, T.R. (2008): Research Methodology, Paluwa Prakashan Ltd., Kathmandu
- Best J.W and Kahn J. V. (2010). Research in Education, PHI Learning, Pvt. Ltd. New Delhi.
- Cohen L., Manion L and Morrison K. (2010). Research Methods in Education. Routledge, London and New York.
- Cramer, Duncan (2003). Advanced Quantitative Data Anlysis. Open University Press.
- Creswell, J.W. (2002). Research Designs: Qualitative, Quantitative and Mixed Method Approach.
- Donna, M. and Pauline, E.G. (2008): The Handbook of Social Research Ethics, Sage Publications
- Dowdy Shirley and Wearden Stanley, Chilko Daniel. (2004).Statistics for Research.New Jersy: John Willey& Sons Publication.
- Drapper, N. and Smith, H. (1968): Applied Regression Analysis, John Wiley and Sons
- John, F. (2008): Applied Regression Analysis and Generalized Linear Models, Sage Publication Inc.
- Kerlinger, F.N. (1983): *Foundations of Behavioural Research*, Surjeet Publication, India
- Kish, L. (1965): *Survey Sampling*, John Wiley and Sons
- Kothari C. R. (2011): Research Methodology: Methods and Techniques, New Age International Publication, New Delhi.
- Moser, C and Kaltan, G. (1979): *Survey Methods in Social Investigations*, Heinman Education Books, UK
- Mujis, Daniel. (2004). Doing Quantitative Research in Education with SPSS.London.Thousand Oaks.New Delhi: Sage Publications.
- Pranee, L.R. and Douglas, E. (1999): *Qualitative Research Methods: A Health Focus*, Oxford University Press
- *Procedures for Developing Grounded Theory*, Sage Publication.Richardson, J. (2002): Handbook of Qualitative Research Methods for Psychology and the Social Sciences, Blackwell Publishing Co.
- Scot, Davi, and Usher, Robin (2011). Researching Education: Data Methods and Theory in Educational Enquiry.London:New Work: Continnum International Publishing Group
- Singh, Kultar. (2007). Quantitative Social Research Methods. Los Angelos, London.New Delhi. Singapore. Sage Publications
- Strauss, A. and Corbin, C. (1998): Basics of Qualitative Research: Techniques