**TEC4101 Research Methods**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Period per  Week | | | Contact  Hour per  Semester | Weighted  Total Mark | Weighted  Exam Mark | Weighted  Continuous Assessment Mark | Credit  Units |
| LH | PH | TH | CH | WTM | WE | WCM | CU |
| 45 | 00 | 30 | 60 | 100 | 60 | 40 | 4 |

**Rationale**

Research methodology is the study of how to perform scientific research. This course looks at strategies for performing research in Computer Engineering, from problem formulation to validation of a proposed solution. The course discusses some basic questions about the nature of science and of computer engineering, and gives the student experience with forming a research plan and with specific validation methods. The course spans multiple elements including time management, writing and presentation skills, and general considerations for experiment design and planning. **Course Content**

***1. Introduction***

 Definition of Research

 Role of Research in the Computer Engineering Profession

 Types of Research (Basic Vs Applied; Primary Vs Secondary; Exploratory

Vs Constructive Vs Empirical)

 Research Processes (The Scientific Vs Historical Research Process)

 Information Literacy Strategies

 Research Funding

 Research and Publishing

***2. Elements of General Academic Writing***

 The Writing Process (Invention, Composition and Revision)

 Research Concept Note (Synopsis)

 Proposal

 Thesis Report

 Papers

 Abstracts

 Formatting Style (MLA Vs APA)

***3. Identifying and Formulating a Research Problem***

 Definition of Research Problem

 Identify a Research Problem (Sources of Research Problems)

 Testing the Feasibility of the Research Problem

 Formulating a Research Problem

 Statement of the Problem

 Components of a Problem Statement

 References and Bibliography

 Appendices

 Pagination of Research Proposal

***4. Developing Other Proposal Components***

 Formulating a Research Title

 Formulating and Stating the Research Objectives

 Stating the Research Justification

 Literature Review

 The Research Methodology

 The Research Resources Plan (Work plan, and Budget)

***5. Research Ethics***

 Intellectual Property Rights (Makerere IPM Policy and other International

IPM Policies)

 Research Ownership and Mandate of Researcher

 Research and Citations (Notation and Standards)

 Plagiarism (Definition, manifestation, and consequences)

 Authenticity of Facts and Opinions (Proper Research Language and avoiding weasel word and fallacies)

 Rights of Human and Animal Survey Respondents

***6. Data Collections and Analysis***

 Designing and Executing a Survey

 Data Collections Instruments and Methods (Questionnaires Vs Interview

Vs Check Lists)

 Designing Effective Questionnaires

 Case Studies

 Designing and Conducting Experiments

 Software for Data Analysis

***7. Presentation of Research***

 Oral Presentation (Proposal and Viva Voce)

 Use of Presentation Aides

 Use of Graphics and Animations in Presenting Research

 Presentation Language

**Learning Outcomes**

**On completion of this course the student should be able to:**

 Formulate a detailed statement of the problem, objectives and develop a comprehensive research proposal

 Execute bibliographic searches to obtain information about prior work.

 Analyse research literature to obtain relevant information, identify trends, and produce annotated bibliographies.

 Have appreciation of appropriate citation and attribution in research.

 Select an appropriate method of solution.

 Use appropriate tools for data capture and analysis.

 Design and conduct of experiments.

 Carry out technical writing and presentation of results for publication

**Recommended and Reference Books**

*[1]* John W. Creswell**, (2006).** *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications, Inc; 3rd Edition. **ISBN-10:** 1412965578, **ISBN-13:** 978-1412965576

*[2]* Donald H. McBurney and Theresa L. White, (2006).  *Research Methods*, Wadsworth

Publishing; 7 Edition. **ISBN-10:** 0495092088, **ISBN-13:** 978-0495092087

*[3]* Anthony M. Graziano and Michael L. Raulin (2006). *Research Methods: A Process of Inquiry*. Allyn & Bacon; 6 Edition. **ISBN-10:** 0205484751, **ISBN-13:**

978-0205484751

*[4]* Kenneth Bordens and Bruce Barrington Abbott, (2007). *Research Design and*

*Methods: A Process Approach*. McGraw-Hill Humanities/Social Sciences/Languages;

7 Edition. **ISBN-10:** 0073129062, **ISBN-13:** 978-0073129068