Course title: Research Methods in Computer Science

Course code: COSC4123

Credit hours: 2 ECTS: 3 Contact hrs: 2 Lab hrs: 0 Tutorial hrs: 0

Prerequisite: None

Course category: Compulsory

Year: IV Semester: I

Course Description

The course focuses on the study of current methods and techniques in computer science research. The major topics includes research in computing, proposal preparation, using resources to conduct research, writing research papers and making presentations, ethical issues. The instructional methods and techniques include traditional lectures with some assignments, student presentations and group problem solving.

Course objectives

Upon completion of the course, the students will be able to:

Describe computing research methods
Develop effective research proposal
Conduct research effectively in computer related fields
Appropriately use resources to conduct research
Organize and prepare technical papers, thesis and presentations
Work and cooperate effectively with other research workers on a computing research
Aware of the research ethics and other related issues

Course outline

Chapter 1: Introduction and Overview of Research (5 hr)

1.1. What is Research and not Research?

1.2. Scientific Research
1.3. Objectives, Motivations and Significance of Research

1.4. Requirements and Characteristics of Research
1.5. Types and Approaches of Research

1.6. Research Methods and Problem Solving
1.7. Effective Report Writing Principles and Criteria for Good Research

1.8. Evaluating and Reviewing Research Results

1.9. What is Research in Computing?

Chapter 2: Processes in Conducting Research (6 hr)

2.1. Overview of Current State of the Art Areas and Techniques in Computing

2.2. Actors, Roles and Relationship

2.2.1. The Student

2.2.2. The Supervisor

2.2.3. The Examiner/Evaluator

2.3. The Process

2.3.1. Developing Research Proposal

2.3.2. Developing Problem Description

2.3.3. Following the Objectives

2.3.4. Presenting and Analyzing the Data

2.3.5. Drawing Conclusion and Identifying Future Work

2.3.6. Presenting and Defending Orally

2.3.7. Preparing Final Research Documentation (Thesis)

2.4. Proposal Preparation

2.4.1. Choosing a Subject Area

2.4.2. Choosing a Problem within the Subject Area

2.4.3. Quality Assurance of Initial Ideas

2.4.4. Write Research Proposal

2.4.5. Sample and More Acceptable Research Proposal Structure

2.4.6. Research Proposal Check-list

2.5. Literature Reviews

2.5.1. Importance and Roles of Literature Review

2.5.2. Skills and Keys to Effective Literature Review

2.5.3. Literature Sources (Journals, Conference Proceedings, Books, Reports, Thesis, etc)

2.5.4. Literature Review Writing

2.6. Assessment Criteria

Chapter 3: Resources to Conduct Research (5 hr)

3.1. Digital Libraries (IEEE, ACM, Science Direct, Springer, etc.)

3.2. Documentation Tools (Ex: Latex) and Language Skill
3.3. Team Work

3.4. Datasets

3.5. Simulation, Experimental or Visualization Tools

Chapter 4: Writing Research Papers and Making Presentations (6 hr)

4.1. Structure of Good Quality Papers, Citations and References
4.2. Making Excellent Presentation

4.3. How to Write Good Quality Thesis and Papers (Journal and Conferences)

Chapter 5: Research Ethics (4 hr)

5.1. Ethical Issues in Research

5.2. Plagiarism, Falsification, Fabrication

5.3. Academic Honesty Related Issues – Ex. Misleading Authorship
5.4. Other Ethical Issues in Computing

Chapter 6: Data Collection and Analysis (6 hr)

6.1 Data Collection (primary and secondary data)
6.2 Analysis of Data with case studies

Assessment methods

Assignment/quizzes	20 %
Research report	20
Mid semester examination	20%
Final examination	40%

Text books and References

General textbooks are not suitable for this course, but there are a growing number of research papers research published in quality journals such as IEEE and ACM that explore models, frameworks as well as contents in Computing Research Methods to help students to become an expert in computing.