**Title (Units):** **COMP 7160 Research Methods in Computer Science (3,3,0)**

**Course Aims:** To introduce research and principal research methods in Computer Science; To explain the skills of writing and publishing research papers; To examine examples drawn from different research areas as case studies on various aspects of the principal methods for life-long learning.

**Prerequisite:** NIL

**Course Intended Learning Outcomes (CILOs):**
Upon successful completion of this course, students should be able to:

| No. | Course Intended Learning Outcomes (CILOs) |
|---|---|
| | **Knowledge** |
| 1 | Explain the basics of research in Computer Science |
| 2 | Describe the principal research methods in Computer Science |
| 3 | Identify the importance of the research ethics |
| | **Professional Skill** |
| 4 | Develop skills of writing and publishing research papers in Computer Science |
| 5 | Apply appropriate research methods to conduct research in Computer Science |

**Calendar Description:** This course aims to prepare students for advanced research by examining how to plan, conduct, and report on research in the Computer Science field. Students will learn the methods involved in each step of a research project, including formulating research problems, problem solving techniques, theoretical/empirical validation, and publishing. Students will also examine examples drawn from different research areas as case studies on various aspects of the principal methods for lifelong learning.

**Teaching and Learning Activities (TLAs):**

| CILOs | TLAs |
|---|---|
| 1-4 | Students will acquire the research methods, skills, and knowledge through lectures, case studies, paper reading and presentation assignments. |
| 5 | Students will work on a research project to gain research experience. |

**Assessment:**

| No. | Assessment Methods | Weighting | CILOs to be addressed | Remarks |
|---|---|---|---|---|
| 1 | Continuous Assessment | 100% | 1-5 | Paper reading and presentation assignments are designed to test students' understanding of the principal research methods. A research project is designed to assess how well students acquire research skills. Proposed breakdown (could be adjusted according to the instructors' specific requirements):<br>• Research project assignment 40%<br>• Paper reading and presentation 30%<br>• Survey writing 30% |

**Rubrics:**

| | Excellent (A) | Good (B) | Satisfactory (C) | Fail (F) |
|---|---|---|---|---|
| Explain the basics of research in Computer Science | Thorough explanation of the basics of CS research | Explanation of most of the basics of CS research | Explanation of some basics of CS research | Explanation of little basics of CS research |

| | Excellent (A) | Good (B) | Satisfactory (C) | Fail (F) |
|---|---|---|---|---|
| Explain the principal research methods in Computer Science | Thorough explanation of almost all CS research methods | Explanation of most of the CS research methods | Explanation of some of the CS research methods | Explanation of a very limited number of CS research methods |
| Have a thorough understanding of the research ethics | Thorough understanding of the research ethics | Good understanding of the research ethics | Limited understanding of the research ethics | Bare understanding of the research ethics |
| Develop skills of writing and publishing research papers in Computer Science | Demonstration of excellent skills of writing research papers | Demonstration of good skills of writing research papers | Demonstration of satisfactory skills of writing research papers | Demonstration of very limited skills of writing research papers |
| Apply appropriate research methods to conduct research in Computer Science | Mastery of appropriate research methods to conduct CS research | Good application of appropriate research methods to conduct CS research | Application of some research methods to conduct CS research | Failed application of research methods to conduct CS research |

**Course Intended Learning Outcomes and Weighting:**

| Content | CILO No. |
|---|---|
| I. Basics of Research | 1 |
| II. Planning Research | 2, 5 |
| III. Conducting Research | 2, 5 |
| IV. Writing and Publishing Papers | 4, 5 |
| V. Research Ethics | 3 |
| VI. Case Studies | 1-5 |

**References:**

John W. Creswell and J. David Creswell. Research Design. Qualitative, Quantitative, and Mixed Methods Approaches, Sixth Edition, SAGE Publication, 2022.

Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, Joseph Bizup, and William T. FitzGerald. The Craft of Research, Fourth Edition, University of Chicago Press, 2016.

Charles Ling and Qiang Yang. Crafting Your Research Future: A Guide to Successful Master's and Ph.D. Degrees in Science & Engineering, Morgan & Claypool Publishers, 2012.

William Strunk Jr. and E. B. White. The Elements of Style, Fourth Edition, Pearson, 1999.

R. Panneerselvam. Research Methodology, 2nd Edition, PHI, 2014.

Philip Guo. The Ph.D. Grind, Online Book, 2012.
Ref: https://www.youtube.com/watch?v=zHp2rxR2LTc

**Course Content in Outline:**

**Topic**

I. Basics of Research

II. Planning Research

III. Conducting Research

IV. Writing and Publishing Papers

V. Research Ethics

VI. Case Studies