

COMP 5112 (Research Methodology in Computer Science)

Department of Computer Science / Faculty of Science and Environmental studies

Winter 2024

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**Teaching Assistant (TA) Information**: To be assigned

**Course Identification**

Course Number: Comp 5112

Course Name: Research Methodology

Course Location: D2L

**Course Description/Overview** - Provides an overview of recent research in computer science and introduces several advanced research topics depending on the research of the instructor. Students will be exposed to basic knowledge and skills about conducting scientific research, which includes critical and creative thinking, qualitative and quantitative research approaches, research life-cycle and time management. Students will complete a research review paper on a select topic.

**Course Learning Objectives**

This course examines advanced methods, techniques and software for computer science researches. The aim is to provide graduate students with the methodological skills necessary for them to carry out independent research. It provides the students with an advanced introduction to qualitative and quantitative research methodology, modeling techniques, data gathering and analysis. This course aims at studying various aspects of the CS research process. You will develop the skills and methods required to establish your research process. This course includes examining a specific research question, conducting a study and critical review, learning the research area theoretical background and its practical applications, figuring out what is the conclusions and future research work. The main objective is to inspire the development of critical thinking, oral presentations, research methods and article writing skills. A strong emphasis will be placed on applying sound principles of software to real-world problems. There will be a semester-long task wherein students select a research method, design, implement it, and present the accomplishment result periodically.

**Course Resources**

Course Website(s)

* myCourseLink

Recommended Course Text(s)

-Research Methodology in Computer Science, Ryhan Ebad, Centrum Press. (2014) ISBN-10: 9350843374

Additional/optional Courses Text(s) – Will be provided by the instructor during the term.

**Course Schedule/Outline**

|  |  |
| --- | --- |
| Date  | Tentative Topic |
| week 1  | Introduction to Research Methodology in Computer Science |
| week 2 | Qualitative and quantitative research methodology, modeling techniques, data gathering and analysis. |
| week 3 |  Examining a specific research question, conducting a study and critical review,  |
| week 4 | * Research methods and the formulation of research hypotheses.

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| week 5 | Business intelligence strategy |
| week 6 | Data Science tools, technologies and methods |
| Feb 20 | Holiday or Break (Study Week) |
| week 7 | Data collection and analysis  |
| week 8 | Methods used to conduct data analysis and reach inference  |
| week 9 | Article writing skills  |
| week 10 | Implementation of the selected research methodology |
| Week 11 | Performance, evaluation and assessment |
| Week 12 | Presenting results, outcomes and recommendations |

**Assignments and Evaluations**

|  |  |
| --- | --- |
| Item | Value |
| Research proposal and critical review  | 15% |
| Implementing proposed research methodology to real-world problems.  | 30% |
| Class Participations:  | 15% |
| Presenter Evaluation:  | 10% |
| A final package of a paper in IEEE Format, technical report, source code, and a complete PPT.  | 30% |
| Total | 100 |

**Assignments**

There will be tasks in which students will read papers, do critical review, formalize the main objectives, explain the methodology and submit a report with the related materials at the end of each task. Graduate students are required to attend and participate in this course. In addition, the student is responsible for evaluating scientific papers, giving presentations, asking questions, participating in discussions and exchanging scientific ideas. The topic of these presentations is to be determined in consultation with the course instructor. Students are required to upload all the course delivered materials to D2L. The evaluation will be based on your ability to identify relevant issues, in-depth reasoning (i.e. giving specific examples) and suggestions for improvements. Organize your work with power point slides and reports, and effectively communicate and share your developed work to the rest of the class.

**Course Policies**

My expectations for this course are as follows:

* Students should follow the behavioral standards (this could be a reference to the [Student Code of Conduct - Academic Integrity](https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/node/51239))
* It is important requirement and expected that students will arrive on time and stay for the entire class. Also, you are asked to turn off electronic devices (except computer) during class including cell phones.

**Academic Integrity Statement:**

I understand and agree that:

(1) Unless otherwise allowed by the course instructor, I must complete the assignments in this course without the assistance of anyone else.

(2) Unless otherwise allowed by the course instructor, I must not access any sources or materials (in print, online, or in any other way) to complete any course exam.

I further understand and agree that, if I violate either of these two rules, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviors that support the University’s academic values.

**Information to consider including for online (asynchronous or synchronous) course delivery to assist in preventing the unauthorized distribution of course materials.**

**Copyright**

Students should be aware that all instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Instructors can use the following statement in your mycourselink/D2L site:**

Copyright Compliance:

I understand and agree that all instructional, reference, and administrative materials to which I am given access in this course (the "course materials"), whether they consist of text, still or kinetic images, or sound, whether they are in digital or hard copy formats, and in whatever media they are offered, are protected in their entirety by copyright, and that to comply with this copyright and the law

(1) I may access and download the course materials only for my own personal and non-commercial use for this course; and

(2) I am not permitted to download, copy, or store (in any medium) any text, image, or sound component of the course materials for any other purpose whatsoever, or to forward or share, transmit, broadcast, show, post or play in public, adapt, or change in any way any text, image, or sound component of the course materials, except as expressly authorized, and only to the extent authorized, in writing, by the course instructor."

I further understand and agree that, if I infringe the copyright of the course materials in any way, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University’s academic values.

**Regulations**

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University [Academic Calendar](http://navigator.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=25&chapterid=6999&loaduseredits=False). This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules (Lakehead University Regulations webpage, 2020-21).

**Academic Integrity**

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one’s own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the [Student Code of Conduct - Academic Integrity](https://www.lakeheadu.ca/students/student-life/student-conduct/academic-integrity/node/51239) for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

**Supports for Students** – there are many resources available to support students. These include but are not limited to:

* [Health and Wellness](https://www.lakeheadu.ca/current-students/student-health-and-counselling-centre)
* [Student Success Centre](https://www.lakeheadu.ca/current-students/student-success-centre)
* [Student Accessibility Centre](https://www.lakeheadu.ca/current-students/student-services/accessibility/)
* [Library](https://library.lakeheadu.ca/)
* [Lakehead International](https://www.lakeheadu.ca/international)
* [Indigenous Initiatives](https://www.lakeheadu.ca/indigenous)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact [Student Accessibility Services](http://studentaccessibility.lakeheadu.ca/)  (SC0003, 343-8047 or sas@lakeheadu.ca)