Medical Health Informatics

Research project and seminar
Methodology, data analysis, and communication in medical bioinformatics

Department of Pathology & Laboratory Medicine

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Although this academic year might be different, Western University is committed to a thriving campus. We encourage you to check out the Digital Student Experience website to manage your academics and well-being. Additionally, the following link provides available resources to support students on and off campus: https://www.uwo.ca/health/

1. Technical requirements

Internet connection   Laptop or computer

Working microphone

2. General outline

Medical or health informatics is an interdisciplinary field that stands at the intersection of computer sciences, the health and medical sciences, and the information sciences, to improve health outcomes. Health informaticians facilitate the collection and use of health-related data, information and knowledge that will enable and support all aspects of safe, efficient and effective health services, *e.g.*, planning, resource management, decision support, research, development, organization, provision and evolution of health services.

Medical bioinformatics is also an interdisciplinary field at the intersection of computing and medical sciences that has developed largely independently of medical/health informatics. A scientist in medical bioinformatics is responsible for analyzing massive 'omic datasets to extract new biomedical knowledge on fundamental processes at cellular, physiological and population levels; and developing, validating and maintaining data analysis pipelines to support the clinical diagnosis and treatment of disease.

By definition, these are interdisciplinary fields in which both aspects of computer science (*e.g.*, algorithms, data structures and databases) and medical sciences (*e.g.*, the pathophysiology of disease) are required. The specialization in medical health informatics has introduced you to a combination of foundational courses in both fields. An additional course in health informatics and information management will provide greater insight into the roles and functions of informatics within the health system.

The purpose of this seminar and research-based course and research project in 4th year is to introduce you to the qualitative and quantitative skills required to pursue a career in data-driven research in academic, hospital, research institute or pharmaceutical settings.

This will involve:

- the formulation of a research proposal;
- collection, exploration and visualization of data;
- data analysis, including appropriate statistical or 'machine learning' methodology;
- the oral and written presentation of the study.

Independent study, self-directed analysis and effective communication skills will be emphasized. Students are expected to spend about 15 hours per week working on their chosen research

problem under the supervision of a member of the university faculty. Specific projects and assignment to supervisors will be worked out between the student and supervisor early in September.

In addition, a weekly seminar or oral communication will be held remotely via Zoom or a similar platform. A tentative schedule is attached. You will be required to present your project proposal/progress report during the Fall term (in written and oral form) and a final report (written and oral form) during the Winter term.

3. Course outline

Introduction & orientation
During the first two weeks of September, you will meet with and be assigned to your supervisor(s). In consultation with student and supervisor, attendance within the laboratory (or working remotely) and weekly expectations will be delineated.

You will have a session on project management, including standard practices in software development including version control (*e.g.*, git) and external documentation. You wlil also have a session on effective communication in both visual and written formats. You will be introduced to the LaTeX typesetting language and the BibTeX reference management system, and alternative frameworks for slide-based presentations including beamer and revealJS.

Research project
You will have received a listing of potential projects and supervisors prior to the start of classes. During the first week of classes (the week of September 7), you will be asked to set up a meeting with your potential research supervisor. Final matching of students with supervisors will take place during that week or the next (if necessary). Students will report to their faculty supervisor by no later than Monday, September 21, to discuss weekly hours, your project and the initial research proposal.

A written research proposal is due by November 4 (submit to OWL and copy to supervisor).

The final written research project report will be due the last week of class in the Winter term (April 5, 2020) (submit to OWL and copy to supervisor).

Scientific communication
During the weekly seminar sessions, students will have an opportunity to practice their oral presentation skills, and to present their initial research proposal (in November) and a final research project report (in March).

4. Objectives and evaluation

Objectives
  1. Techniques

      - To develop a familarity with a variaty of methodologies and approaches to problem solving in health informatics and medical bioinformatics.

  2. Research projects

      - To develop skills in the formulation of a hypothesis, or the use of data for exploratory, hypothesis-free analysis
      - To develop skills in the design and execution of a research project

- To develop skills in the critical evaluation of medical and scientific information in the peer-reviewed literature.

3. Scientific communication
   - To develop skills in oral communication and the effective use of visual aids, *e.g.*, slides.
   - To develop an engaging and effective scientific writing style (Heard, S. B. The scientist's guide to writing: how to write more easily and effectively throughout your scientific career.)

Evaluation

Participation		10%
Supervisor evaluation	5%	
Participation and contribution in seminar discussions	5%	
Research Project		70%
Written proposal	15%	
30 min presentation of proposal	15%	
Final written report (Winter term)	20%	
30 min presentation of final report (Winter term)	20%	
Assignments		20%
Elevator pitch	5%	
Journals assignment	5%	
Writing assignment	5%	
Data visualization gallery	5%	

5. Seminar schedule - Wednesdays

Date	Topic	Assignment
September 9	Introduction - What is medical health informatics? What is medical bioinformatics?	Prepare elevator pitch
September 16	Project management - Your dry-lab 'notebook' (Markdown, Jupyter, Binder) - Version control	Create a GitHub or GitLab account
September 23	Elevator pitches	
September 30	Mining the literature - Open access and predatory journals - Bibliographies with BibTeX	Find your journals: the good, the bad, the ugly
October 7	Journal tours	
October 14	Communication - Scientific writing	Rewrite an abstract
October 21	Communication - Data visualization	Curate a figure gallery
October 28	Communication - Effective presentations	Gallery tours
November 4	**No class** - Fall reading week	Written proposals due
November 11	Student updates	
November 18	Proposal presentations	
November 25	Proposal presentations	
December 2	Student updates	
December 9	Student updates	

Schedule for Winter term to be distributed in January.

Key dates

September 9	Decision on supervisor	Students should by now have met with their thesis supervisor to communicate expectations on their time commitment, any necessary training, and to map out the outline and scope of their thesis project.
September 23	Final decision on project	Students should have met with their supervisor to decide on their project outline and a plan for starting work.
November 4	Written proposals due	Formatting guidelines will be provided. Proposals must be submitted electronically by e-mail to both the supervisor and to the course coordinator.
November 18/25	Proposal presentations	Present the research proposal to fellow students and faculty supervisors.

6. Professionalism & Privacy

Western students are expected to follow the Student Code of Conduct. Additionally, the following expectations of professional conduct apply to this course:

- Students are expected to follow online etiquette expectations provided on OWL
- Recordings are not permitted (audio or video) without explicit permission
- Permitted recordings are not to be distributed
- All recorded sessions will remain within the course site or unlisted if streamed.

7. Be successful in this class

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful.

1. Invest in a planner or application (such as Microsoft To Do) to keep track of your courses. Populate all your deadlines at the start of the term and schedule time at the start of each week to get organized and manage your time.

2. Make it a daily habit to log onto OWL to ensure you have seen everything posted to help you succeed in this class.

3. Follow weekly checklists created on OWL or create your own to help you stay on track.

4. Take notes as you go through the lesson material. Treat this course as you would a face-to-face course. Keeping handwritten notes or even notes on a regular text document will help you learn more effectively than just reading or watching the videos.

5. Connect with others. Try forming an online study group and try meeting on a weekly basis for study and peer support.

6. Do not be afraid to ask questions. If you are struggling with a topic, check the online discussion boards or contact your instructor(s) and or teaching assistant(s).

7. Reward yourself for successes. It seems easier to motivate ourselves knowing that there is something waiting for us at the end of the task.

8. Western Academic Policies and Statements

Absence from Course Commitments
Academic Consideration for Student Absences

In the interest of the health and safety of students and health care providers, you are no longer required to seek a medical note for absences this term. If you are unable to meet a course requirement due to illness you should use the Illness Reporting Tool. This tool takes the place of the need to submit a medical note and the Self-Reported Absence System formally used by undergraduate students.

Accommodation for Religious Holidays
The policy on Accommodation for Religious Holidays can be viewed here.

Academic Offenses
Scholastic offences are taken seriously, and students are directed here to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

Accessibility Statement
Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review The policy on Accommodation for Students with Disabilities.

Correspondence Statement
The centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner. You can read about the privacy and security of the UWO email accounts here.

Turnitin and other similarity review software
All assignments will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. Students will be able to view their results before the final submission. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between Western University and Turnitin.com.

9. BMSUE Academic Policies and Statements

Copyright and Audio/Video Recording Statement
Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

10. Rounding of Marks Statement

Across the Basic Medical Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

11. Support Services

The following links provide information about support services at Western University.

Academic Counselling (Science and Basic Medical Sciences)

Appeal Procedures

Registrarial Services

Student Development Services

Student Health Services