BINF*6999 Bioinformatics Masters Project

Fall 2022
Section(s): C01

College of Biological Science
Credit Weight: 1.00
Version 1.00 - September 08, 2022

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1 Course Details

1.1 Calendar Description

A major research project and paper is completed and presented by students in the Master of Bioinformatics program. Projects may involve either the development or application of bioinformatics methods. Professionalism and communication skills in written, oral, visual, and computational formats are also emphasized.

Pre-Requisites: BINF*6110, BINF*6210
Restrictions: Restricted to Master of Bioinformatics students.

1.2 Course Description

Students of the Master of Bioinformatics program will complete a Major Research Project over one or two semesters. This is a capstone program experience that will involve applying, adapting, and extending your technical skills and conceptual knowledge in the context of an authentic research project. Professional skills are also emphasized, such as communicating with diverse audiences in oral, visual, written, and computational formats.

Projects will typically address one or more of the following:

- Investigating a novel research hypothesis by applying bioinformatics tools
- Developing a software pipeline for data analysis and/or interpretation
- Using data analyses to direct decision making
- Developing and/or formally testing a new bioinformatics software tool or algorithm

Students will be co-advised for their specific research project by one university faculty member with computational, statistical, or mathematical expertise and one faculty member

with expertise in the life sciences. Projects may be based in an academic research group in the university or may additionally involve collaboration with an external partner. Students will also receive guidance from the course coordinators during a biweekly class meeting.

1.3 Timetable

Format: Instruction will be in remote format for the Fall 2022 semester.

Time Commitment per Week: As a 1.0 credit research course, students are expected to work on their projects 20-24 hours/week consistently throughout the semester. The primary focus will be the completion of the project work begun in Summer 2022.

Advisor Meetings: Students should make arrangements to meet with their project advisors approximately weekly (minimum biweekly) throughout the semester. Whenever possible, we encourage joint meetings with everyone.

Class Meetings: During summer 2022, there will be three class meetings with the course coordinators held via Zoom. These meetings provide opportunities to discuss project progress and obtain feedback from the course coordinator and the class, and the course coordinator will address any questions that class members have about the course. The meetings are on Thursdays from 1:00-2:30 PM Eastern time on the following dates: September 8, October 27, November 17.

Oral Presentations: The final oral presentations for students completing their project in Fall 2022 will be held on December 1. Students should attend all of the presentations for all class members. The exact time block for presentations will depend on the availability of additional grading referees, and will be provided approximately two weeks prior to the presentation date.

1.4 Final Exam

BINF*6999 has no final exam.

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2 Instructional Support

2.1 Instructional Support Team

Course Co-ordinator:	Andrew Hamilton-Wright Associate Professor, School of Computer Science
Email:	andrew.hamilton-wright@uoguelph.ca
Office Hours:	Please raise general course questions in the class meetings for the benefit of all class members. Please email Dr. Hamilton-Wright if you would like to set up an individual appointment.

2.2 Bioinformatics Program Coordinator

Master of Bioinformatics students also benefit from interaction with Dr. Monica Wong, Bioinformatics Program Manager. Dr. Wong coordinates external collaborative projects, professional development workshops, etc., and has significant expertise in statistics and bioinformatics. Dr. Wong's email address is: moniwong@uoguelph.ca

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3 Learning Resources

3.1 Advisorship and Tips for Success

* Inter-disciplinary advisorship is one of the main benefits and supports available in BINF*6999. We encourage students to maintain good communication to ensure that you can benefit from regular input.

* We recommend that students should connect with your advisors approximately weekly throughout the semester to discuss your work. CC all of your advisors on email communications to maintain good communication and to keep everyone on the same page.

* Be sure to discuss any problems that you encounter early, so that you and your advisors can discuss a solution.

* Students and advisors should also discuss and decide upon a relevant solution for **backing up** your work and for documenting, sharing, and commenting upon code developed, as suitable for your project.

* We encourage all class members to participate in lab meetings of your advisors and to discuss your work with your course peers and others.

* Touch base with the course coordinators if you have any questions or concerns throughout the semester.

3.1 Library

The University of Guelph library is also a key resource for this course. You should consult literature when planning your project, writing your proposal, and writing up your final report. It is essential to place your work in the context of current knowledge and available bioinformatics tools. To access journal articles when off campus, you can log into the library resources from the following link:

https://www.lib.uoguelph.ca/campus-login

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4 Learning Outcomes

BINF*6999 is a research-intensive course that serves as a capstone experience for the MBINF

program. Students will apply, synthesize, and build upon skills learned in prior courses to conduct authentic research. In addition to applying technical skills and critical thinking, this course also emphasizes professionalism and communication skills. By successfully completing the course, students should be well prepared to undertake future large projects, whether in further graduate studies or in the workplace.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Design a study considering gaps in knowledge or in available bioinformatics tools.
2. Apply, adapt, or create bioinformatics tools.
3. Problem solve with proficiency in bioinformatics research.
4. Communicate research goals and results effectively to a diverse audience in oral, written, visual, and computational formats.
5. Write a scientific report to a graduate-level standard, demonstrating: a clear flow of ideas; completeness such that the study is reproducible; correct grammar, formatting, and punctuation.
6. Demonstrate high-level literacy, through reading, interpreting, and citing literature.
7. Show high-level numeracy, as demonstrated through making reasoned analytical choices, conducting statistical analysis, and/or programming a logical analytical pipeline.
8. Manage your time effectively and make consistent progress.
9. Exhibit collegiality and ethical academic and professional practice, including: contributing to research group discussions; interacting with others respectfully; receiving and acting upon constructive feedback from advisors and peers; citing your sources; acknowledging the contributions of others; and conducting and reporting research with transparency and integrity.

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5 Teaching and Learning Activities

5.1 Seminar

Topics:

During the Fall 2022 semester, three virtual class meetings will be held with the course coordinators via Zoom (see dates above).

The first class will include an overview of the Fall term, a chance for students to discuss their projects, and an opportunity for questions and discussion.

The remaining classes will provide additional opportunities to discuss project progress, as well as a session where you may share draft figures for discussion and friendly feedback.

The format for the discussions will be semi-guided. The course coordinator will provide an agenda allowing each student to have time to present findings, challenges and ideas. Then, there will be time for questions and discussion.

5.2 Advisor Meetings

A key learning activity for this course will be regular meetings with your Advisors.

Tips for success include:

* Set up a meeting schedule at the beginning of the semester. Meeting format should be discussed and agreed upon (e.g. in person, TEAMs, Zoom, etc.).

* Arrive to meetings prepared. For example, you could briefly present your progress over the past week, discuss your ideas, and outline any problems you have encountered and questions that you have about the next steps. Arriving prepared will ensure that meetings are productive and that you are able to benefit from input.

* Be courteous. If at all possible, inform your advisors in advance if you cannot make a scheduled meeting.

* Get feedback on your work early. This will help you to complete a high-quality project and avoid surprises at the end. For example, you can share draft figures for commenting using screen sharing during your regular advisory meetings. You should also share a draft of your proposal and your final report for qualitative commenting prior to submitting the version for grading. Be sure to hold a practice presentation for feedback, such as with your advisors, in lab meeting, and with your course peers.

* Participate in your group's lab meetings, departmental seminars, journal discussions, etc., as available. This will help you to meet others, obtain inspiration for your work, and contribute collegially to the work of others.

5.3 Interacting with your Course Peers

We encourage students to form a study group with class members. Here are a few example activities you may consider to enhance your success and wellbeing:

* consider meeting weekly to discuss ideas and to help one another with troubleshooting

code

* hold general get-togethers (e.g. to play games online or safely in person) to help with moral support and mental wellbeing

* meet to practise your oral presentation in advance of the formal course presentation

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6 Assessments

Instructions and Rubrics

Detailed instructions and a grading rubric for each assessment component will be posted to the BINF*6999 CourseLink site. This is the same rubric as was posted in the Summer 2022 portion of the course, and Assignments completed during the Summer are simply carried forward to this rubric. The remaining milestones for this fall term are: the final presentation and the final written report. The presentation will be done in class (see above). Additionally, the final written report should be emailed to the Advisors (CC the course coordinator) as well as uploaded to the indicated Courselink dropbox along with any supplementary material (code, etc.) that you wish to include.

The course coordinators recognize that the pandemic has caused challenges for many individuals, whether due to personal health, familial responsibilities, etc. Therefore, if you find that you cannot meet a deadline due to illness or compassionate reasons, please contact the course coordinator to discuss your situation **prior to the deadline date (unless something beyond your control makes this impossible)**. No late penalty will be imposed **in this case**, and the course coordinators and Graduate Coordinator will discuss the course and your overall program with you.

6.1 Assessment Details

BINF*6999 Project Proposal (already completed during Summer term) (10%)

Date: Fri, Jun 3, 5:00 PM

The project proposal is due at 5:00 PM on Friday, June 3. Students should discuss their proposal ideas with their advisors prior to submission. Students are also expected to provide intellectual input into the development of the overall project. The assignment must consist of a one-page written proposal (single-spaced) plus an indication of your meeting schedule with your advisors and a timeline for the semester. If suitable for your project, you may also include a figure (not included in the one-page limit). An example of a suitable figure would be a flow chart outlining your proposed analytical pipeline. The proposal is graded by the two course coordinators. In the event that a course coordinator is also an advisor, the second grader will be a member of the Bioinformatics Curriculum Committee. Students submit the proposal to the Dropbox on the BINF*6999 CourseLink site. Students should also share a copy with all advisors via email.

Self-Reflection Essay (already completed during Summer term) (5%)

Date: Fri, Jul 8, 5:00 PM
Students will write a short (ca. two pages, single-spaced) essay reflecting upon their progress, personal philosophy, lessons learned during the research and experiential learning process, strategies for addressing challenges, and future directions. This assignment is due at 5:00 PM on Friday, July 8 to the CourseLink Dropbox folder. Each student's assignment is graded by one of the course coordinators. In the case that a course coordinator is also an advisor, the other course coordinator (i.e. not the advisor) will grade the student's essay. This assignment will also include an appendix with an updated timeline.

Oral Presentation (20%)
Date: Thu, Dec 1, Virtual
Students who are finishing BINF*6999 in the summer semester will deliver an oral presentation on December 1, 2022. The presentations will be delivered through remote means. Students will be graded by two or more graders from the Bioinformatics Graduate Faculty (other than their advisors). The presentations also provide a venue for questions and discussions and for students to share research results with peers. Please hold these dates. Further details will be provided about the virtual conference at least two weeks in advance. All BINF*6999 students should attend.

Students who are extending BINF*6999 into the Fall semester should give a progress presentation in your lab meeting in July or August, 2022. You will then deliver your final oral presentation in late November or early December.

BINF*6999 Final Research Report (50%)
Date: Fri, Dec 9, 5:00 PM
Students will complete a major research paper of up to 30 pages in total length (including all components and formatted with 2.0 line spacing). The research paper is graded by both faculty advisors. In the case that the student additionally has a third external advisor, the external advisor will also also be invited to grade the report. Typically, an average of the 2-3 grades will be taken to generate the final report grade. If there is more than a 10% discrepancy between any pair of submitted grades, the course coordinators will work with the evaluators to resolve the difference and will determine the final grade. Students submit the report in two ways by the due date and time: to the CourseLink Dropbox and by email to all advisors, CCing the course coordinator (andrew.hamilton-wright@uoguelph.ca).

Quality of Research Effort (15%)
Date: Fri, Dec 9
Advisors will assign a grade for the quality of research effort, including consistent weekly effort, preparation for meetings, creativity and perseverance in trouble-shooting, receiving and acting upon feedback, and professional and collegial interactions with others.

6.2 Grade Interpretation

Please note that 65% is the passing mark for graduate courses at Guelph, while a GPA of at least 70% is required to earn a Master's degree. At the University of Guelph, students must achieve a GPA of at least 80% at the Master's level to be eligible to apply to the PhD in Bioinformatics program.

The grading scale description below is taken from the graduate calendar:

https://www.uoguelph.ca/registrar/calendars/graduate/current/pdffiles/calendar.pdf#page=20

"Course grades help to determine who may or may not continue in a program to completion, to recommend advancement to a subsequent degree, and to determine eligibility for in-program scholarships and possible consideration for awards upon graduation. However, graduate coursework represents a smaller fraction of the student's overall evaluation than do undergraduate course grades. Performance in research is a key component of evaluation at the graduate level.

90-100 A+. Outstanding. The student demonstrated a mastery of the course material at a level of performance exceeding that of most scholarship students and warranting consideration for a graduation award.

80-89 A- to A. Very Good to Excellent. The student demonstrated a very good understanding of the material at a level of performance warranting scholarship consideration.

70-79 B. Acceptable to Good. The student demonstrated an adequate to good understanding of the course material at a level of performance sufficient to complete the program of study.

65-69 C. Minimally Acceptable. The student demonstrated an understanding of the material sufficient to pass the course but at a level of performance lower than expected from continuing graduate students.

0-64 F. An inadequate performance."

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7 Course Statements

7.1 Expectations and Tips for Success

Students and advisors should read the "Expectations" document, which will be posted to the BINF*6999 CourseLink and shared with advisors via email.

7.2 Employment and Funding

As a 1.0 credit course, students are expected to work on BINF*6999 20-24 hours/week. Students may hold employment, whether with their advisors or others. However, as possible, we encourage students not to work more than 10-15 hours/week in other employment in order to retain suitable research time to meet the expectations of this course. Students may be awarded a research stipend from the program, adjudicated by the Bioinformatics Program Committee, for their fourth semester (see below).

7.3 Option to Extend into Fall Semester

Students have the option to apply to extend their research project through the fall semester.

Extension must be approved by the course coordinators, who will verify strong research progress with the advisors. At the discretion of the Bioinformatics Program Committee, and depending upon strong academic and research performance in the MBINF program, a stipend of up to $5,000 may be provided for the fall semester (4th semester of MBINF program).

Students must contact the course coordinators by email by 5:00 PM on Friday, June 24 if they wish to apply to extend. The email should contain a brief summary of the progress to date, plans for expanding the research, and the student's MBINF transcript (unofficial electronic copy from WebAdvisor is sufficient). Students should also request that their advisors submit an email in support of this request to the course coordinators by the same date. The advisor letter should include: attestation of good progress to date, statement that the project scope is suitable for expansion, and statement that the advisor is available to continue providing regular advisorship during the fall semester. Students will be notified of the decision within approximately one week, including the decision on extension and information about whether a stipend is approved.

Extending students must register for BINF*6999 again for the fall semester. For MBINF students who extend to the fall semester, the self-reflection essay is still due on July 8, and a written progress report is due by August 12.

Students may also consider transferring from the MBINF to the MSc in Bioinformatics (thesis-based) program. This is an excellent option for students interested in pursuing a more in-depth research experience. Approval for program transfer would be subject to strong research performance, scope for project expansion, as well as the availability of funds for the MSc stipend (through advisor grants and/or scholarships and/or Teaching Assistantships, depending upon the home department). Students interested in this option should discuss this with their advisors and must also contact the BINF*6999 course coordinators and Bioinformatics Graduate Coordinator (Steffen Graether graether@uoguelph.ca) by Friday June 24th to discuss the steps and paperwork involved with applying for a program transfer. Approved transfer students would complete an MSc thesis. Research completed to date as part of BINF*6999 would be applied towards the MSc thesis, with the official program transfer effective in September (i.e. start of semester 4). The MSc program would typically be completed over 3 additional semesters of research, with program completion by August, 2023.

7.4 Final Remarks on BINF*6999

We hope that students will both enjoy and embrace the BINF*6999 project experience. We greatly look forward to your presentations and to learning about what you have created and discovered!

8 College of Biological Science Statements

8.1 Wellness

If you are struggling with personal or health issues:

- Counselling Services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
- Student Health Services is located on campus and is available to provide medical attention.
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.selfregulationskills.ca/

8.2 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/index.html. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml)

8.3 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website

https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of

course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
