



# BIOM\*3210 Critical Thinking in the Health Sciences

Fall 2022

Section(s): C01

Department of Biomedical Sciences

Credit Weight: 0.50

Version 1.00 - August 20, 2022

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## 1 Course Details

### 1.1 Calendar Description

This course will explore a variety of issues related to the scientific ideals and practical realities of health sciences research and its clinical applications. Topics will include critical thinking, critical appraisal of the medical literature, the principles of evidence based medicine, and selected issues related to scientific integrity.

**Pre-Requisites:** 7.50 credits including (1 of BIOL\*1070, BIOL\*1080, BIOL\*1090)

**Restrictions:** BIOM\*4210

### 1.2 Course Description

Systematic assessments of the quality of published clinical research typically indicate that only about 20-30% of randomized controlled trials (RCTs) are free of important errors, and that a similar proportion are highly flawed and misleading. It is therefore important that the graduates of healthcare programs be equipped with skills to assess RCT quality prior to incorporating their findings into clinical practice. Unfortunately, professional programs and most undergraduate and graduate programs provide limited education on how to evaluate these studies, and as a result many physicians, veterinarians, dentists, and other healthcare providers lack the ability to gauge whether a trial they read is relatively sound or likely to be misleading. The good news is that you don't need to be a statistician or epidemiologist to be able to detect many of the common errors in the medical literature. By the end of this course, you will have markedly improved your ability to distinguish the good from the bad.

Even when good scientific evidence has been identified, it is not necessarily used to guide clinical decisions; the information may not be considered at all, or flawed reasoning may enter into the decision making process. We will explore errors of reasoning that are so well

recognized that they have been given names. We will also look at some of the reasons that we are prone to such errors, so we can try to avoid making them.

We will also discuss selected issues related to professional integrity and ethics.

### 1.3 Timetable

Timetable is subject to change. Please see WebAdvisor for the latest information.

### 1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

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## 2 Instructional Support

### 2.1 Instructional Support Team

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## 3 Learning Resources

### 3.1 Required Resources

**Thinking, Fast and Slow. D Kahneman, Anchor Canada, 2013. (Textbook)**  
Available on Ares course reserve.

### 3.2 Recommended Resources

**The CONSORT Statement 2010 Checklist (Website)**  
<http://www.consort-statement.org/checklists/view/32--consort-2010/66-title>

**The CONSORT Statement 2010 Elaboration Document: (Website)**  
<http://www.consort-statement.org/downloads/consort-statement>

**Attacking Faulty Reasoning (5th edition), TE Damer, Thomson Wadsworth, 2005 (better than the 6th edition). (Textbook)**

An excellent resource for understanding fallacies.

**Fallacy Free Reasoning in Medicine: Improving Communication and Decision Making in**

**Research and Practice, J Milos, American Medical Association press, 2009. (Article)**

Focusses on errors of reasoning in medical research and medical communication, and gives examples.

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## 4 Learning Outcomes

### 4.1 Course Learning Outcomes

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

1. *Logic & Reasoning Unit* At the end of this unit, you will be able to:

1. Critically evaluate arguments according to five key criteria, and develop good arguments
2. Recognize common errors of logic and tactics for avoiding a good argument
3. Evaluate potential causes of errors of reasoning with respect to the heuristics and biases associated with our "autonomic decision maker" (Kahneman's *System 1*)

2. *Critical Appraisal Unit* At the end of this unit, you will be able to:

1. Assess the quality of reporting of clinical trials at an intermediate level, based on CONSORT recommendations
2. Justify selected scientific procedures for the avoidance of bias
3. Understand the differences and interrelationships between a clinical trial, a systematic review, and a body of evidence
4. Recognize common ways in which medical research data can be misrepresented in scientific publications

3. *Scientific Integrity & Professionalism Unit* At the end of this unit, you will be able to:

1. Develop informed opinions about ethical issues related to health sciences research, such as plagiarism, fabrication of data, selective citation of the literature, authorship, peer review, and conflicts of interest
  2. Be able to analyze the ethics of medical claims and beliefs using the criteria of WK Clifford
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## 5 Teaching and Learning Activities

## Lectures

Monday, Wednesday, and Friday 1:30-2:20 pm, RICH 2520

Some standard lectures will be given. Some classes will take the form of discussions of short readings that will be posted on Courselink a couple of days in advance. Some materials associated with class discussions will be posted following the class.

## Lecture Schedule

Details regarding lecture topics will be provided on the course website.

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# 6 Assessments

Details will be provided on the course website at the beginning of the semester.

### Examinations

90% of the course grade (two midterms and a final exam)

### Assignments

10% of the grade (group and individual)

*Subject to change with advance notice.*

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# 7 Course Statements

## 7.1 Notes on assessments

### Late Assignments and Quizzes

In the absence of documented extenuating circumstances (medical or compassionate), late submissions will be penalized 10% per day.

No extensions will be granted for technical reasons. Computer and network problems may occur at any time; you are encouraged not to submit your work at the last minute in order to avoid the risk that you will be unable to meet the deadline for this reason.

### Group Assignments

Some learning activities may be completed in assigned groups. Together with the final report, each group must submit a statement outlining the contributions of each group member to the work. In order to receive the group grade, a student must have contributed a fair share to the work. Group members who do not contribute a fair share may receive a reduced grade, or zero, for the assignment.

## 7.2 Academic Consideration for Missed Assignments

If you are unable to meet a course deadline **for medical or compassionate reasons**, please review the regulations on academic consideration in the Undergraduate Calendar and discuss your situation with the course coordinator and/or program counsellor.

If the final exam is missed, application for a deferred exam must be made through your program counsellor and the office of the Registrar as outlined in the Academic Consideration and Appeals section of the Undergraduate Calendar. Please see the calendar for more information.

## 7.3 Attendance

Participation in classroom discussions will help to prepare students for the assessments. Substantial issues that are discussed in class may be examined and will not necessarily be captured in the posted material, so if you are absent from a class you should ask a classmate for notes.

# 8 University Statements

## 8.1 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.

## 8.2 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>

### 8.3 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>

### 8.4 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.

### 8.5 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>

## 8.6 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>

## 8.7 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.

## 8.8 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>

## 8.9 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.

## **8.10 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).

## **8.11 Covid-19 Safety Protocols**

For information on current safety protocols, follow these links:

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

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

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