An American "tapeworm trap" from the 1860s. It didn't work, but its inventor filed for a patent with the US Patent Office anyway. From Thomas Morris' The Mystery of the Exploding Teeth (2018)… we'll hear more about his take on the 19th century's dubious remedies during the course.

Biology 4010: Medical quackery and pseudoscience
Course outline
SDE section
2024S

THE BASICS

About the instructor

My name	Dr. David Law
My office	Simcoe Hall/OA 3004, in Orillia
My email	dlaw@lakeheadu.ca. I check my email daily Monday to Friday, and will try to respond to your questions as quickly as possible during those days.
Office hour	No preset office hour since this is a web course; email me or make an appointment here for a Zoom meeting.
My phone number	None; email me or make an appointment here for a Zoom meeting.
Call me	Dr. Law or David
My preferred pronouns	He, him, you

About the class

- The course runs for 6 weeks: Wednesday, May 1 to Wednesday, June 12.
- All material is posted on MyInfo/D2L; check there for the latest course updates and information.
- Biology 4010 is an asynchronous web course and does not have any "live" content. This means that you can proceed through the material at your own pace, keeping in mind that there is an assignment due and a quiz to write every week.
- Two of the deliverables are videos that you will post of yourself discussing course content These recordings will be on the course D2L site and viewable to the instructor and all students registered in the course.
  - These videos
    - are strictly confidential;
    - may be used only by the instructor and students registered in the course only for purposes related to the course, and
    - may not be otherwise shared or distributed.
  - Students who are concerned about posting videos of themselves must recognize that these recordings are an intrinsic part of the course; as such, you may choose

not to participate in them but this means your mark will be zero for these deliverables. These recordings are made under the authority of sections 3 and 14 of [the Lakehead University Act, 1965](). Questions about the collection of images and sounds in these recordings may be directed to the chair of biology, Dr. Azim Mallik ([amallik@lakeheadu.ca]()).

Calendar description

Biology 4010 | Medical Quackery and Pseudoscience

Description	The rise of medical quacks and charlatans and their distortion of real science to exploit medical and biological research, particularly from the 19th to the 21st centuries. Philosophy of science; development of the scientific method; elements of pseudoscience; examples of pseudoscience throughout history; tools for medical and scientific literacy.
Credit weight	0.5 FCE
Offering	3-0; or 3-0
Course classification(s)	Type C: Engineering, Mathematical and Natural Sciences

LEARNING OUTCOMES

During this course, you will develop both your "hard" science-based skills and "soft" social and literary skills.

Science-based skills

- Distinguish between science-based and non-science-based knowledge
- Understand the links between medicine and human health.
- Recognize how medical research builds on previous knowledge by conducting experiments to answer questions.
- Know the names and backgrounds of key historical figures in medicine and quackery.
- Recognize how medical charlatans exploit scientific ignorance to sell their products.

Social and literary skills

- Conduct a respectful, informed discussion about the history of medical quackery and pseudoscience with your peers.
- Read, interpret and extract useful information from primary scientific journal articles and discuss them with your peers

LEARNING MATERIALS

There isn't a course textbook. I'll post videos and readings by week under **Content** in D2L. Course material is derived mainly from the books below.

Title *Links are to a book's Goodreads page*	Author(s)	Year	Publisher	ISBN
Quackery: A Brief History of the Worst Ways to Cure Everything	Lydia Kang and Nate Pedersen	2017	Workman Publishing	9780761181
The Sawbones Book: The Hilarious, Horrifying Road to Modern Medicine: Revised and Updated For 2020	Sydnee McElroy, Justin McElroy, Teylor Smirl	2020	Weldon Owen	9781681880
Bad Science	Ben Goldacre	2011	Emblem/ M&S	978-0-7710-3 579-1
Bad Pharma	Ben Goldacre	2012	Signal/ M&S	978-0-7710-3 629-3
The Quack Doctor: Historical remedies for all your ills	Caroline Rance	2013	The History Press	978-0-7524-8 773-1
Dr. Joe's Science, Sense and Nonsense: 61 nourishing, healthy, bunk-free commentaries on the chemistry that affects us all	Joe Schwarcz	2011	Anchor Canada	978-0-385-66 605-3
Making Modern Science: a Historical Survey	Peter J. Bowler and Iwan Rhys Morus	2005	The University of Chicago Press	978-0-226-06 861-9

Title *Links are to a book's Goodreads page*	Author(s)	Year	Publisher	ISBN
This Is Biology: The Science of the Living World	Ernst Mayr	1997	Belknap/ Harvard	0-674-88469-8
The Growth of Biological Thought: Diversity, Evolution, and Inheritance	Ernst Mayr	1988	Belknap/ Harvard	0-674-36446-5
The Mystery of the Exploding Teeth (and other curiosities from the history of medicine)	Thomas Morris	2018	Dutton/ Penguin Random House	978-1-5247-4370-3
The Death of Expertise: the campaign against established knowledge and why it matters (2nd edition: updated and expanded)	Tom Nichols	2024	Oxford	978-0-19-776383-4

SCHEDULE AND MARKING SCHEME

- One assignment and one quiz are due every week, Tuesday evenings at 11:59 PM EDT.
- The next week's work will go live no later than midnight of that week. This means that you have at least 7 days to review and complete each week's work.
- Assignments are worth 60% of your final mark and quizzes 40%. This emphasizes the importance of showing me your personal views in the assignments and practicing your writing and oral presentation skills.
- This class is half the length of a F or W term 0.5-FCE course: 6 weeks instead of 12. This means that you will have to devote at least twice as much time per week to reading and thinking about the material than for a F or W course.

Week	Dates; Due date *Tuesdays at 11:59 PM*	Topics and deliverables	Weight *% of final mark*
1	May 1 - 7	• The scientific method • Modern science and medicine	
	May 7	Video #1	10
		Quiz #1	6.67
2	May 8 - 14	• Defining pseudoscience and quackery • The origins and history of medical quackery • Pseudoscience versus science	
	May 14	Written discussion forum post #1	10
		Quiz #2	6.67
3	May 15 - 21	• 19th and early 20th century quackery, part 1	
	May 21	Written assignment #1	10
		Quiz #3	6.67
4	May 22 - 28	• 19th and early 20th century quackery, part 2	
	May 28	Video #2: video discussion forum	10
		Quiz #4	6.67
5	May 29 - June 4	• Good vs. bad experimental design • The value of independent and industry-sponsored research	
	June 4	Written discussion forum post #2	10
		Quiz #5	6.67
6	June 5 - 11	• Pseudoscience and quackery in the Internet age • Meta-analysis and drug development	
	June 11	Written assignment #2	10
		Quiz #6	6.67
Total marks			**100**

DELIVERABLES

Each week, you have a quiz and an assignment to complete. I suggest you tackle each week's work in this order:

- Review the readings and take notes.
- Watch the videos and take notes.
- Do the quiz, which will be based on all of the week's material, while it's fresh in your mind.
- When possible, choose your assignment based on the course material you found most interesting. For example, for video or written discussion forum posts, choose your favourite topic.
- Complete your assignment, following its instructions closely to maximize your mark; for example, find, read and incorporate information from peer-reviewed articles in your discussion post.
- **After viewing or reading your assignments, I may have follow-up questions that require us to have a brief discussion on Zoom before I give you a mark. If this happens, I'll email you to set up a meeting time.**

Video assignments

There are 2 video assignments. These will let you practice
- showcasing your knowledge of the course material in a different way, and
- giving oral presentations in a friendly forum.

Access the assignments and their details/instructions in D2L at **Content > Week x > Video assignment #y**.

- Task #1: Video assignment #1 (due at the end of week 1).
- Task #4: Video assignment #2 (due at the end of week 4).

Discussion forums

Discussion forums are an important part of online classes because there is no face-to-face time with your fellow students or prof like there is in a classroom-based course. Posting in forums helps you understand the course content, deepens your learning experience and sharpens your critical thinking skills.

For you to receive discussion participation marks, you must participate regularly with thoughtful posts. For each of the 2 written discussion forums during the course, I will post

specific instructions, such as "post one reply to other posts to obtain your participation marks for this forum."

For all discussion forums, I will post at least 3 discussion topics. One student may reply directly to each of my original questions; there is thus an advantage to posting early. **Further posts <u>must</u> be formatted as replies to those student posts and not directly as replies to my original post.** This means that there is **only one thread allowed for each discussion topic**. Replying to others' posts will encourage your

- deep thought about the subject,
- consideration of other students' points of view, and
- formatting of discussion topics like a conversation, often one that does not have one right answer, rather than an information download.

Thus, **other than the first reply to each discussion topic, further direct replies to the original topics will not count as posts towards your mark for that forum.**

I'll also contribute to the forums, often to try to clarify arguments and prod further thought and replies. I encourage you to reply to my posts… I will be respectful of your point of view.

How do you contribute effectively to discussion forums? Follow these discussion guidelines from Debbie Morrison's *Online Learning Insights* for some hints:

- Use a subject line that relates to your post; this will help create interest and focus for the discussion.
- Write clearly and with expression. Communicating online requires careful and concise writing, but also allows your personality to come through. Though humour is effective and at times relevant in discussion, be sure to avoid sarcasm, which does not translate well online.
- Be supportive, considerate and constructive when replying to your classmates. Do not use jargon, slang or inappropriate language. If you disagree with a classmate, please respond in a respectful and tactful manner. Any posts that I deem inappropriate will be removed from the discussion board.
- Focus on the topic, relating any class readings and materials from the current module in your post (as applicable).
- Proofread and review your response before hitting the submit button.
- Participate regularly. Improve your learning by being an active and engaged student. Follow and participate in the assigned discussion throughout the module, logging on at least every couple of days while reading and participating in forums as assigned in the module.

Access the discussion forums in D2L at **Content > Week x > Discussion forum #y**.

- Task #2: Written discussion forum post #1 (due at the end of week 2).
- Task #5: Written discussion forum post #2 (due at the end of week 5).

Written assignments

Note the page limits in the instructions for each written assignment… generally 2 to 3 double-spaced pages. Provide cited sources for your statements. You don't have to use any particular citing style (e.g., ADA) since all biology journals are different (what a surprise). One possible citation style is

I am looking for a well-researched review that demonstrates that you have sought out multiple sources to support your statements and that you've thought about the material we've covered in previous weeks.

Access the assignments and their details/instructions in D2L at **Content > Week x > Written assignment #y**.

- Task #3: Written assignment #1 (due at the end of week 3).
- Task #6: Written assignment #2 (due at the end of week 6).

Quizzes

You will write a 10-minute 10-question multiple choice quiz in D2L each week. **Write the quiz at any time during the week; each week's quiz closes on Tuesday evening at 11:59 PM that week.** These test your knowledge of all of the week's material. As long as you complete the readings, watch the videos and take notes on these, you will have what you need to do well.

Access the quizzes and their details/instructions in D2L at **Content > Quizzes > Week x**.

COURSE IMPROVEMENT

I value student feedback to help me improve my courses. Below are some data from the Student Feedback on Teaching survey the last time I taught this course in 2022A.

For the 23 questions where 1 = strongly disagree and 5 = strongly agree,
- Average score = 4.93 / 5
- Standard deviation +/- 0.13
- Number of survey participants = 5 out of 32 total students

The only comment I received for the question "What suggestions do you have for improving this course?" was "No suggestions." If/when you fill out the SFT for the course in June, please give me concrete suggestions for improvement.

USING ARTIFICIAL INTELLIGENCE

Wondering whether you can use AI like ChatGPT to complete coursework? You're not alone. First, read Lakehead's checklist for its appropriate use. Using AI may violate the Lakehead Academic Integrity Code (Section III) and be subject to disciplinary action. It's best to check with me prior to using it if you are unsure. There is no shame in doing so since I'm very aware of these tools. As this technology evolves, it's up to your instructors to ensure that student marks reflect their own work.

The first written assignment (week 3) will have you use a chatbot like ChatGPT to research your paper, and you'll critique how much help it really was. To get a head start, watch this Vox video about chatbot use in higher education. It summarizes my thoughts about acceptable and unacceptable use of AI to complete coursework.

A list of the possible ways to use AI for your coursework as listed in the Vox video is below. I'm OK if you use AI for most of their examples; exceptions are listed below:

Research

- Answers to a homework question (sometimes)
    - It's very tempting to let AI do all the work and once you have it for you to say "I have the answer; I'll go back and understand it later". But will you?
    - As long as you're not handing in the answer for marks… where is the ethical line?
- Background information on a topic
- Definitions or explanations of a concept
- Sources to find more information
    - To me, these 3 uses are no different than a Google search or looking up a topic on Wikipedia, but keep in mind how flawed these sources can be
    - Your sources must be
        - Genuine and relevant
        - Specifically, mostly reviews and primary literature articles from peer-reviewed journals
- Summaries of readings and lectures
- Study guides for an exam
    - OK, but read and/or watch these first to make sure you understand and can summarize them without AI help

Ideas

- Ideas for how to respond to an assignment
    - But not using AI to actually write your assignment…again, where is the line?
- Instructions for solving a problem

- ○ But don't rely on it to do your work for you since you'll have to do it yourself on a test
- Outline for a paper or presentation
  - ○ AI can suggest how to best organize your thoughts
- Examples, analogies and counterarguments
  - ○ Use at your own risk

Writing

- Script for a presentation
  - ○ As long as it's based on your own original work and not AI-generated text… AI summarizing AI is bad
- Feedback on your work
  - ○ This one is for your profs. I haven't used AI yet for this purpose, but I can see how it might be useful
- Revision of a text to improve it
  - ○ While being aware that AI doesn't always "improve" written work
- Revision of a text to change word count
  - ○ Sometimes a necessary editing step
  - ○ Summarizing and collating ideas is a key part of work life, and AI doesn't always do a great job

There's only one use of AI from the Vox list that I consider plagiarism:

- Writing a draft of a paper or discussion post
  - ○ It's too tempting to let it do all the work, including writing the final version

ACADEMIC DISHONESTY

Lakehead has a <u>Student Code of Conduct – Academic Integrity</u>. All students in this course should read the Code and become familiar with it.

To summarize the relevant parts of the Code, the penalty for plagiarism or cheating on any part of this or any other course is zero for the work where the student is caught. Serious or repeated plagiarism, including cheating on an examination or test, will result in a mark of zero for the course and may result in expulsion from Lakehead.

There are two particular places in this course where cheating might occur:

1. submitting written work that you did not research and write;
2. participating in a discussion forum under any name other than your own.

Academic dishonesty for any of these areas will result in a mark of **zero** for the work concerned. If this happens, I'll also submit

To ensure academic fairness for students who work hard, rest assured that I will take **every precaution** to ensure that potential cheaters are caught and subjected to the appropriate penalty.