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
2025S

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

About the class

- The course runs for 6 weeks: May 1 to June 12.
- All material is posted on myCourselink/D2L (which I'll call MCL below); 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 MCL 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.
- Define science and pseudoscience and give examples of them.
- 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 respectful, informed discussions about the history of medical quackery and pseudoscience with your peers.
- Read, interpret, extract and discuss with your peers useful information from a variety of media. This includes popular readings and internet videos, but is focused primarily on primary and secondary scientific journal articles.

LEARNING MATERIALS

No course textbook. I'll post videos and readings by week under **Content** in MCL. Course material is derived mainly from the books below. For all this material, watch/read it, take some notes, and you will be prepared to do well on the weekly quiz and written/oral assignment.

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
[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	978-1-5247-4 370-3
[Pseudoscience: An Amusing History of Crackpot Ideas and Why We Love Them](#)	Lydia Kang and Nate Pedersen	2024	Workman	978-1-5235-2 425-9
[Doctors and Distillers: The Remarkable Medicinal History of Beer, Wine, Spirits, and Cocktails](#)	Camper English	2022	Penguin Random House	978-0-14-313 492-3

SCHEDULE AND MARKING SCHEME

- One assignment and one quiz are due every week, Wednesday evening at 11:59 PM EDT.
- The next week's work will go live no later than 12:01 AM EDT Thursday 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 *Wednesdays at 11:59 PM EDT*	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 two deliverables: an assignment and a quiz. 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.**

1. ASSIGNMENTS

Assignment goals

Your primary goal in the assignments is to show me and your class colleagues that you examined all of the material I assigned for your topic, took notes, thought about it, and used it to build the core of your written or oral assignment.

To do this, for each assignment you must cite **at least two** of the references I provide for your topic (writings, videos, etc.). Each of these two citations must include at least one **direct quote** (e.g., with quotation marks) from each source with time in video or page number, for example:

> … it's difficult to separate science from pseudoscience. "The common thread … is that it took time to sort out the truth from the lies, the signal from the noise." (Kang and Pedersen 2024, p. ix).

Additionally, you must provide one extra primary or secondary source for each assignment. This is a fourth year course, so I assume you know the difference between STEM primary and secondary sources; here is a refresher from the University of Victoria library if you're unsure.

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 these assignments and their details/instructions in MCL 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

These 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 <u>only one thread allowed for each discussion topic</u>. 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 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 MCL 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

These are short essays on a relevant topic. A well-researched written assignment will
- demonstrate that you have read/watched the material I assigned
- use the assigned material to support your statements
- if possible, incorporate related material we've covered in previous weeks.

Note the page limits in the instructions for each written assignment: generally 2 to 3 double-spaced pages. Provide cited sources for your statements in a reference list at the end of the assignment, using the citation style of the journal Plant Physiology, as below. Note the specific formatting I'm expecting, e.g., bolding and lack of italics and concluding period.

Xue M, Atallah BV, Scanziani M (2014) Equalizing excitation-inhibition ratios across visual cortical neurons. Nature **511**: 596–600

Access the written assignments and their details/instructions in MCL 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 MCL 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 MCL at **Content > Quizzes > Week x**.

COURSE IMPROVEMENT

I value student feedback to help me improve my courses. Below are the data from the Student Feedback on Teaching survey the last time I taught this course in 2024S.

For the 23 questions where 1 = strongly disagree and 5 = strongly agree,
- Average score = 4.7 / 5
- Standard deviation +/- 0.2
- Number of survey participants = 7 out of 29 total students

Complete (i.e., I didn't leave any out that might make me look bad) and unedited comments for the 3 survey questions are below.

1. What did you like about this course?
- Amazingly interesting course, loved the content. Dr Law was fantastic!
- I liked how the workload/deliverables remained consistent throughout the course. There were no surprises, and everything was laid out ahead of time. This made it easy to keep track of things due and plan accordingly. The feedback given was prompt and useful, written with an approachable tone that made you feel like you were talking to a teacher

who cared. The mix of video and reading kept things fresh and was useful when studying- if I didn't feel like reading that day, I could watch videos and still learn something. There being no midterms or final exams also made it so I tried my best at every quiz and assignment, which overall increased what I got out of this course.

- For such an abbreviated course, the feedback on the assignments/discussion posts was returned very quickly and that really helped me to not commit the same mistakes over and over again. The feedback was also very obviously personalized and it was clear that Dr. Law had taken the time to read/ watch and really consider the content of the submissions. I really appreciate the time taken by Dr. Law.
- Even though I found the discussion posting format a little awkward I do think that it was very useful in the sense that it forced me to format responses to the questions asked in a more conversational tone, while still incorporating the sources provided/found.
- Dr. Law is a really good professor.
- I had him in my first year in Cell Biology, and he recommended this course to our whole program in Barrie.
- Initially, I wasn't sure about the course, but I have grown to like it.
- It's interesting to learn how medical quackery is used in almost everything in our lives, from the products we use to the medical advice we follow.
- I loved reading about the history of medicine and how it developed.
- This course is definitely making me look at today's medicine with a new perspective.
- I liked that you could work through the course material at your own pace throughout the week and had the opportunity to complete each week's assignments before the due dates.
- A nice short course to take during the spring semester. Time demand was great, while still delivering loads of content which is applicable in all scientific fields. I enjoyed the implementation of video discussion posts alongside written posts and mini-essays, which provided a variety of ways to demonstrate acquisition of knowledge from the content.
- Fascinating topic and I liked that the texts selected were not too dense and hard to read. This would be a great full-semester in person course!

2. What suggestions do you have for improving this course?
- None it was great, I wish there was a secondary follow up course
- I personally really didn't enjoy the video replies, but I understand why they were incorporated and am grateful we only had to do two of them.
- The only thing I would maybe change is the availability of course work.
- I would like all the learning objectives to be available from the beginning, so that it is not a weekly thing but more at your own pace.
- I don't mind the weekly quizzes and assignments, but I would prefer to have the whole course load at the beginning of the spring semester.
- Maybe some physical lecture slides students can refer back to to reinforce the learning objectives.

- It felt that despite having all the content readily available, you only needed to really learn one or two of the subjects for that week to be able to answer the discussion posts. Yes, we still needed to read through for the quizzes, but those questions were easily answered using common sense (which isn't inherently a bad thing). Generally, more implication of all the content from a week might be nice so some of it doesn't get washed out.
- Organization of the MCL site (see below) and possibly a zoom component instead of the videos to encourage discussion instead of making an oral essay. I didn't find the discussion post element did much to add to the learning experience because we weren't really discussing, it was just assignments posted in series.

3. Additional Comments
- Na
- Thank you for your encouraging feedback, I really appreciate it!
- I really enjoyed this course and I was thinking that a course about pseudoscience in environmental topics would also be really interesting!
- Overall good course and I enjoyed taking it.
- Good course, interesting material that was enjoyable to read. Next time, please ensure that there aren't duplicates of the content in the MCL site and transfer previous materials over to the new class if you're switching portals partway through; it's annoying to have to go back and forth between the two courses as well as the duplicates in the new one to check discussion posts and grades, and look for the week one content that was posted in the old course. It's easier to just have it all in one place.

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 [Student Code of Conduct – Academic Integrity](#). 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.