Containers of some typical English patent “medicines” from the late 18th and early 19th centuries. We’ll discuss some of these. From Wikipedia.

Biology 4010: Medical quackery and pseudoscience

Course outline

SDE section, 2026S

THE BASICS

About me

My name	Dr. David Law
My office	Simcoe Hall/OA 3004, in Orillia
Contact info	Email me at 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. If we can't resolve your issue by email, make an appointment here for a Zoom meeting.
Office hour	No preset office hour since this is a web course.
Call me	Dr. Law or David
My preferred pronouns	He, him

About the class

- Runs for 6 weeks: May 4 to June 15.
- All material is posted on myCourselink/D2L (MCL); 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. Michael Rennie (biochair@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

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

Textbooks

No course textbooks. I'll post videos and readings by week under **Content** in MCL. Course material is derived mainly from the books below and online videos. If I don't cover one of these books in the course, they make for interesting reading. For all the material I assign, watch/read it, take some notes, and you will be prepared to do well on the weekly quiz and written/video assignment.

Title *Links are to a book's Goodreads page*	**Author(s)**	**Year**	**Publisher**	**ISBN**
Pseudoscience: An Amusing History of Crackpot Ideas and Why We Love Them	Lydia Kang and Nate Pedersen	2024	Workman	978-1-5235-2425-9
Quackery: A Brief History of the Worst Ways to Cure Everything	Lydia Kang and Nate Pedersen	2017	Workman	978-0-7611-8981-7
The Sawbones Book: The Hilarious, Horrifying Road to Modern Medicine: Revised and Updated For 2020	Sydnee McElroy, Justin McElroy, Teylor Smirl	2020	Weldon Owen	978-1-68188-0
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
Bad Science	Ben Goldacre	2011	Emblem/ M&S	978-0-7710-3579-1
Bad Pharma	Ben Goldacre	2012	Signal/ M&S	978-0-7710-3629-3
The Quack Doctor: Historical remedies for all your ills	Caroline Rance	2013	The History Press	978-0-7524-8773-1
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	978-0-385-66605-3

Making Modern Science: a Historical Survey	Peter J. Bowler and Iwan Rhys Morus	2005	The University of Chicago Press	978-0-226-06861-9
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
Doctors and Distillers: The Remarkable Medicinal History of Beer, Wine, Spirits, and Cocktails	Camper English	2022	Penguin Random House	978-0-14-313492-3

Cost of learning materials

The information provided below complies with the Ontario Ministry of Colleges, Universities, Research Excellence and Security requirement for disclosing the cost of learning materials to students.

Total cost of textbooks and learning materials	None
Restrictions preventing students using a different edition of the textbook or other learning material	None
Use of Open Educational Resources (free resources)	Yes; links to this material are provided on the course MCL site
Required use of educational materials previously acquired for another course	None

SCHEDULE AND MARKING SCHEME

General info

- Depending on which deliverables you choose to submit, one post/assignment and one quiz are due every week, Sunday evening at 11:59 PM EDT.
- The next week's work will go live no later than 12:01 AM EDT Monday of that week. This means that you have at least 7 days to review and complete each week's work.
- Post/assignments are worth 50% of your final mark and quizzes 50%. The high weighting of the 3 posts/assignments emphasizes the importance of showing me your personal views in your videos/writings and practicing your 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.
- See MCL for each week's topics.

Weekly schedule

Week	Dates	Deliverables
1	May 4 - 10	Week 1 deliverables open
	Due Sunday May 10 at 11:59 PM EDT	Video discussion forum post #1
		Quiz #1
2	May 11 - 17	Week 2 deliverables open
	Due Sunday May 17 at 11:59 PM EDT	Written discussion forum post #1
		Quiz #2
3	May 18 - 24	Week 3 deliverables open
	Due Sunday May 24 at 11:59 PM EDT	Written assignment #1
		Quiz #3
4	May 25 - 31	Week 4 deliverables open
	Due Sunday May 31 at 11:59 PM EDT	Video discussion forum post #2
		Quiz #4
5	June 1 - 7	Week 5 deliverables open
	Due Sunday June 7 at 11:59 PM EDT	Written discussion forum post #2
		Quiz #5
6	June 8 - 14	Week 6 deliverables open
	Due Sunday June 14 at 11:59 PM EDT	Written assignment #2
		Quiz #6

Mark allocation

- 5 quizzes @ 10 % each (6 quiz opportunities; lowest mark dropped) = 50% of final mark
- 3 video or written discussion forum posts or written assignments @ 16.67% each = 50% of final mark
    - You can submit **any combination of 3 posts/assignments**.
    - If you submit more than 3, I will only mark the first 3.
    - I strongly suggest that you wait for my feedback before you submit your next post/assignment.

DELIVERABLES

Each week, you have up to two deliverables: a forum post or 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 quizzes and 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.**

DISCUSSION POSTS AND ASSIGNMENTS

General advice

Examine **all** of the material I assign for your topic: take notes, think about it, and use it to build the core of your written or oral assignment.

To show me and your peers that you did this, 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), 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 at least **one relevant extra primary or secondary peer-reviewed 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

You can submit up to 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 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 must 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 may 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. 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.

You have 6 quiz opportunities; I'll drop your lowest mark. I encourage you to write all 6 to maximize your mark.

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 2025S.

For the 23 questions where 1 = strongly disagree and 5 = strongly agree,

- Average score = 4.5 / 5
- Standard deviation +/- 0.2
- Number of survey participants = 5 out of 21 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?

- I enjoyed the discussion posts as they encouraged students to not only learn and understand the material, but also engage with their peers. This allowed further conversations and topics to be talked about, which may not have been asked by the professor. All in all, these discussion posts paved the way for students to gain a deeper knowledge about the content.

- It covered so much ground in the world of Pseudoscience and Quackery. The course title was so bizarre and yet, the topics covered were fascinating. The reading list was also excellent, I ended up reading the whole books, not just the excerpts provided by Dr. Law.
- I really enjoyed the information and learning material in this course, it was interesting and engaging. I am glad I took this course. It combined a lot of interests for me and I learned great information that I can use both in my studies and generally in my life and with my family (spotting hallmarks of pseudoscience in products and treatments).
- I like Dr. Law's structure of summer courses because I know exactly what to expect and the work load is manageable in the short period of time the course runs.
- I thoroughly enjoyed taking this course as a 4th year option. The professor was very detailed in his expectations and course objectives. I enjoyed the media and reading materials that allowed the course to take a couple of different types of learners. I would have loved to have learned more about things like chiropractic and acupuncture processes and how medically backed up they are!

2. What suggestions do you have for improving this course?

- In the announcements we had a brief video of Dr. Law. I'd really enjoy more of him discussing some of the impacts of the various topics. The readings and videos selected were relevant, but having him discuss it might have more impact. For the assignments due, I wish it had been weighed as "best of 5, worst one dropped" only because this allows some leeway for a bad week or a topic that didn't light a spark.
- Again I really do appreciate the structure of Dr. Law's summer courses, the only feedback I would give is the discussion posts structure (both written and video) can be a bit challenging especially for someone who has learning differences and takes a bit longer to read and write. I found many times (as I am sure most have) that I work on my post and go to post it and a new post is there and I have to go back and redo mine because the new post has used the same information I worked on. What other teachers do is you post and then comment on another post (could be with strict guidelines on what you need to do with that post) levels the field for those who need adaptations such as time. In the summer courses there isn't much time so the accomodation of time is almost null and void. Also maybe allowing for all of the material to be open where as people can get a bit ahead would help for this as well. The first few weeks have less reading material than the others and time can be used to read ahead and prepare for the upcoming week if you choose to use your time this way. Many of the online courses through the year are like this and it is helpful for this type of situation
- I thought this course was very well prepared. Maybe an open live discussion forum can be helpful to some students that need collaboration of ideas to ensure a better understanding of certain topics that may be overwhelming especially if background knowledge has not been obtained.

3. Additional Comments

- I'd recommend this class. I took it based on the novelty of its title and I was not disappointed. The Sawbones book was a fun read, and as a personal aside, watching Bill Nye as an adult was excellent nostalgia combined with learning.
- I hope Lakehead offers this course in the Fall/Winter so that more students could take it.
- I would recommend this course as informative, fun and engaging and I always recommend Dr. Law's courses as good summer courses because of their structure and organization. I really appreciate the planning and organization that Dr. Law takes in his courses.

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.

To get a good understanding of the ways you can use generative AI for coursework, watch this Vox video about chatbot use in higher education. It summarizes my thoughts well.

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.