

**SPPH 505: Scientific Basis for Epidemiologic Thinking  
SYLLABUS; Term 1, 2017**

<b>TIME:</b>	Wednesday, 1:00 - 4:00pm September 6 – November 29, 2017 (3 credits)
<b>LOCATION:</b>	SPPH 143
<b>INSTRUCTOR:</b>	Dr. Jane Buxton
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<b>OFFICE HOURS:</b>	By appointment Rm 107 SPPH, Wednesday and Friday
<b>TEACHING ASSISTANT</b>	TBD

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**PURPOSE:**

To identify the critical features of scientific thought for epidemiology students. Our world is overflowing with information and misinformation; we are faced with the task of wading through it, deciding what to accept and what to reject. The main focus of this course will be on exploring what 'scientific reasoning' is. We consider several frameworks for the evaluation of hypotheses and explore research methods outside the reductionist approach including qualitative methods and realist reviews. We will discover how estimates, modeling, sensitivity analyses, meta-analysis and economic assessments are used to make decisions about health (care). We will consider how advertising and the media, ideology, perceptions of risk and ethical considerations affect the evaluation of hypotheses and public perceptions.

**LEARNING OUTCOMES:**

By the end of the course, students will be able to: Evaluate media and lay reports of scientific research and claims; grasp the usefulness and limitations of various frameworks to evaluate reports and understand the strengths and limitations of different types of evidence and research approaches.

*This course was adapted from 1.5 credit course conceived by Professor Richard Mathias with input from Professor Barry Beyerstein and Dr. Lloyd Oppel*

## **SPPH 505 Critical Thinking: COURSE READINGS and TOPICS**

There is no required textbook for this course. Suggested readings include:

- Sagan, Carl. The Demon-haunted world: Science as a candle in the dark. Ballantine books, New York 1996
- Carol Travis and Elliot Aronson. Mistakes were made (but not be me) Why we justify foolish beliefs, bad decisions and hurtful acts. Harvest books 2008, Harcourt Inc.
- Dan Garner. Risk: Why we fear the things we shouldn't – and put ourselves in greater danger. Emblem Editions 2009
- Beyerstein BL. Alternative medicine and common errors of reasoning. Academic Medicine 2001;76:230-237  
[http://journals.lww.com/academicmedicine/Fulltext/2001/03000/Alternative\\_Medicine\\_and\\_Common\\_Errors\\_of.9.aspx](http://journals.lww.com/academicmedicine/Fulltext/2001/03000/Alternative_Medicine_and_Common_Errors_of.9.aspx)

### **WEEKLY READINGS:**

**Week 1;** Sep 6<sup>th</sup> James Lett. A Field Guide to Critical Thinking

[http://www.csicop.org/si/show/field\\_guide\\_to\\_critical\\_thinking/](http://www.csicop.org/si/show/field_guide_to_critical_thinking/)

**Week 2** Sep 13<sup>th</sup>

Controlling illegal stimulants: a regulated market. Haden 2008.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2238741/>

A public health vision for the management and regulation of psychedelics. Haden, Emerson & Tupper. Journal of Psychoactive Drugs. 2016. <http://www.ncbi.nlm.nih.gov/pubmed/27430375>

**Week 3;** Sept 20<sup>th</sup> Carl Sagan: The fine art of Baloney Detection

<http://dannybhoy1.tripod.com/baloney.htm>

The ranking and reliability of evidence: Sutter MC BCMJ (2006) 48 (1) 16-19

<http://www.bcmj.org/premise/ranking-and-reliability-evidence>

**Students are expected to complete and show certificates for 2 on-line tutorials**

- 1) YorkU academic integrity tutorial **(by Sept 13th)** see next page
- 2) Tri-council policy ethics tutorial - CORE **(by Sept 27th)** see next page

### **USEFUL WEBSITES TO REVIEW FOR CLASS PAPER**

<http://www.csicop.org/> this site will lead you to the Skeptical Inquirer.

<http://m.snopes.com/> gives a wide range of urban & other legends.

<http://www.quackwatch.com> Guide to Quackery, Health Fraud, & Intelligent Decisions

### **TOPICS TO BE ADDRESSED DURING THE COURSE**

- Overview of scientific reasoning and evaluating a claim
- Influences of emotions and desires on thinking; cognitive and heuristic biases
- How do we know and ranking of evidence
- Ideology: when politics ignores evidence;
- Complementary, integrative and alternative medicine
- Principles of health care and health research ethics
- Influence of the media; health and risk communication
- Qualitative research;
- Meta-analysis and systematic review;
- A view from economics

## SPPH 505: UBC Academic Integrity statement

**UBC Vancouver Senate Curriculum Committee** recommends the following text to be included in all Course Outlines/Syllabi:

*"The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences."*

A more detailed description about academic integrity, including the University's policies and procedures, can be found in the Academic Calendar at <http://calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,0>

## SPPH 505: On line tutorial requirements

### 1. ACADEMIC INTEGRITY

Plagiarism includes but is not limited to the presentation or submission of the work of another person, without citation or credits, as the student's own work. For those unfamiliar with the topic you may find it helpful to complete the brief tutorial found at <http://www.lib.sfu.ca/help/tutorials/plagiarism-tutorial>

Completion of the York U **Academic Integrity Quiz** is a course **requirement** for SPPH 505: [http://www.yorku.ca/tutorial/academic\\_integrity/testinstructions.html](http://www.yorku.ca/tutorial/academic_integrity/testinstructions.html)

Do not log in – (log-in is for YorkU students only). Please print the results page showing you achieved 100%; print your name on the sheet, sign it to confirm you completed it and hand/scan it to TA by **Sept 13<sup>th</sup>, 2016**

### 2. ONLINE TUTORIAL TCPS 2: CORE (Course on research ethics)

Completion of the TCPS 2 tutorial: CORE is a course **requirement** for SPPH 505, completion is also necessary to be a co-investigator on a UBC research proposal. There are 8 modules with additional links for interest; you can stop and return to the tutorial at your convenience; it may take up to 3 hours to complete. <http://www.pre.ethics.gc.ca/eng/education/tutorial-didacticiel/>

Please submit certificate of completion to TA by **Sep 27<sup>th</sup>, 2016**

## SPPH 505 Critical Thinking: EVALUATION OF THE STUDENT

Academic integrity quiz	Pass	Sep 13
Tri-council policy ethics tutorial	Pass	Sep 27
Mid-term exam and qualitative appraisal	25%	TBD
Group abstract and presentation	25%	
Group evaluation of abstract and presentation	Pass	
On-line posts	Pass	
Participation	25%	
Final paper	25%	Dec 7

**Mid term exam: 25%** (Date TBD) Two components:

- 1) Written short answer and multiple choice questions, open book/computer (no internet) on material covered to date in class, required readings and tutorials (2 hr).
- 2) Qualitative paper appraisal using <http://www.biomedcentral.com/authors/rats>

**Group Abstract and Presentation: 25%** (Abstract due 1wk before presentation)

Membership of the presentation group is randomly assigned. Presentations are 20 min maximum plus 10 min discussion led by the group. Issues/topics requiring critical thought will be chosen/assigned; examples include:

- What is cognitive dissonance and how do we deal with it? or Evidence vs. ideology; why do people maintain their belief despite scientific evidence to the contrary?
- Global warming, fact or fiction - what is the real story?
- Is the placebo effect real or in the mind?
- Diffusion of innovation- is the rapid uptake of new therapies progress or dangerous?
- Is the risk perceived by the public related to the real hazard; what influences beliefs?
- Is there an epidemic of gluten sensitivity – fad or reality?
- Does pharmaceutical detailing influence prescribing of critical thinking physicians?

Submit an electronic copy of the abstract (250 words excluding references) summarizing the question, evidence, conclusions and references (including grey literature/websites) to Dr. Buxton, Alissa and group evaluating **1 week in advance**.

**Group evaluation of the Abstract and Presentation: Pass/Fail**

Another group will be assigned to critically assess the presentation and the abstract. The 2 page written evaluation will be submitted electronically.

**On-line discussion: Pass/Fail**

All students to submit postings: including 'new' posts related the presentation topics, readings, recent media or personal/work experience, and responses to posts submitted by peers. # each TBD. Postings due before Nov 29.

**Participation: 25%**

Participation including attendance (there will be a weekly sign in sheet), preparation for class (read materials), participation/contributions to in-class discussions and small group exercises, and your thoughtful on-line posts will be considered.

**Final Paper: 25%**

**Four-five page** (excluding title page and references) 1.5 or double spaced, 12 point on a critical thought topic of your choice. Please submit electronically to Dr. Buxton and TA before midnight **Dec 6<sup>th</sup>**. If submitted late, paper will be marked as per criteria out of 100 but 5 marks (5%) will be removed for each day late.

## SPPH 505 Critical Thinking: CRITERIA FOR MARKING

### Guidelines for group evaluation of abstract and presentation

<b>Content</b>	<b>Potential</b>	<b>Mark</b>
Is the issue / topic clearly presented? Is scientific literature given to support / refute / explore the question and are the sources and quality of evidence given? Are examples appropriate and interesting to the class?	20	
<b>Organization</b> Is there a clear opening statement of the topic and overview of presentation; clear beginning, middle and end? Are the main claims supported with evidence? Is the ending strong and the conclusion justified?	15	
<b>Delivery/visuals</b> Are speakers knowledgeable, enthusiastic about the topic? Do the visuals help class follow the argument; Do slides use key words, not read verbatim?	15	
<b>Time Management</b> - not too rushed, time for questions? -zero if presentation >5 minutes over i.e. 25 mins	5	
<b>Discussion period</b> - Leading and managing questions Listen to whole question before responding, repeat/clarify where appropriate respond to whole class not just questioner	15	
<b>Abstract (250 words) + references</b> Does it summarize the question, provide the evidence, are conclusions clear? Within the word limit? Are references (APA format) appropriate, include varied and scientific sources, anything missing?	20 5	
<b>Total</b>	<b>100</b>	

### Distribution of marks for the written paper

	<b>Potential</b>	<b>Mark</b>
Clear and appropriate claim/assertion; source of claim stated Why chose and relevance of topic to course and to student Background and setting context	20	
Evaluate the evidence using FiLCHeRS Falsifiability / Logic / Comprehensiveness / Honesty Replicability / Sufficiency	50	
Scientific literature reviewed for any data to support or refute Bring in other frameworks covered in course- e.g. economic, policy, ethical, media Gives the conclusion, and justify it	20	
Writing style, integration and references (APA format)	10	
	<b>100</b>	

## ***SPPH 505 Critical Thinking: GRADING***

### **PAPER AND PRESENTATIONS:**

#### **A Level (80% to 100%):**

**A+ is from 90% to 100%:** It is reserved for exceptional work that greatly exceeds course expectations. In addition, achievement must satisfy all the conditions below.

**A is from 85% to 89%:** A mark of this order suggests a very high level of performance on all criteria used for evaluation. Contributions deserving an A are distinguished in virtually every aspect. They show that the individual (or group) significantly shows initiative, creativity, insight, and probing analysis where appropriate. Further, the achievement must show careful attention to course requirements as established by the instructor.

**A- is from 80% to 84%:** It is awarded for generally high quality of performance, no problems of any significance, and fulfillment of all course requirements.

**B Level (68% to 79%):** This category of achievement is typified by adequate but unexceptional performance when the criteria of assessment are considered. It is distinguished from A level work by problems such as: One or more significant errors in understanding, superficial representation or analysis of key concepts, absence of any special initiatives, or lack of coherent organization or explanation of ideas. The level of B work is judged in accordance with the severity of the difficulties demonstrated. B+ is from 76% to 79%, B is from 72% to 75%, and B- is from 68% to 71%

**C Level (55% to 67%):** Although a C+, C, or C- grade may be given in a graduate course, the Faculty of Graduate Studies considers 68% as a minimum passing grade for doctoral graduate students.

### **CLASS PREPARATION AND PARTICIPATION:**

Students are expected to attend all classes and to come to class prepared i.e. having completed the required 'readings' and tutorials and ready to participate actively in class discussion and activities. Your attendance and active engagement in class discussions will be reflected in your participation grade. The instructor and guest speakers take responsibility for learning in the classroom, but as a graduate student you are primarily responsible for your own learning. You will learn best by taking part in the range of activities offered in the course in a constructive and thoughtful manner.

The course instructor will assess your participation over the full term taking into account attendance, preparation for class (as shown by ability to discuss readings), respectful contributions to in-class discussions and small group exercises, as well as your thoughtful on-line posts.

## **SPPH 505 Critical Thinking: GROUND RULES**

In this course we deal with **scientific and philosophical** analyses of issues that often engage very strongly-held personal beliefs. One of the course objectives is to show how deeply-held, but often unexamined, assumptions about the nature of the world underlie some of these hotly debated areas. This course will lay out the various positions on these issues and will focus on the evidence and arguments associated with them i.e., it will emphasize those approaches that are best supported by scientific evidence and logical arguments. The course is intended to raise the question, “*On what basis* do you hold the beliefs that you do regarding the phenomena under discussion?”

You may not agree with all the positions presented during the course, but it is important that you *demonstrate that you understand* the arguments contained in the course materials. If, after scrutinizing them, you disagree with the conclusions reached by the lectures, readings, and presentations, you should examine **why** you are rejecting them and articulate those reasons in an intellectually rigorous and scholarly manner. You are encouraged to debate these contentious points in what we will ensure is a respectful and civil academic forum.

The first lectures in the course will present the argument that the scientific approach is the most reliable means that the fallible human intellect has devised for determining the nature of reality. For purposes of this course, only *empirical* data and *logical* arguments will count as acceptable support for points you raise in your presentation and essay. Appeals to "revealed truth," religious dogmas, "gut feelings," or putative "other ways of knowing," will not carry any weight unless they can be backed up with empirical data. An important part of the subject matter in this course is to show why the feelings of absolute certainty these other approaches to gaining knowledge provide are often illusory. In summary, **it is the quality of your arguments, and especially the evidence you select to back them up**, that will determine the grade you are awarded.

Answers will be graded on how well you select and integrate information from reading and lectures to support your arguments. You will also be graded on the logic, coherency, organization, and completeness of your essay. You will be rewarded just as much for disagreeing as for agreeing with the major tenets of the course, **provided that your arguments are logically coherent and backed up with credible empirical evidence**. The best answers are those that give examples from the course materials which demonstrate that you understand them and their relationship to one another.

The course aims to encourage open and respectful discussion of issues in an academic forum of students from a variety of backgrounds. We strive to finish within the allotted time; please be respectful of your fellow students and our guest speakers and be on time for the lectures. We are privileged to have such distinguished array of guest speakers for an unavoidable absence, please inform the instructor.

## **SPPH 505 Critical Thinking: TIPS ON THE FINAL PAPER ASSIGNMENT**

The written term assignment is a **four to five page** critique of a questionable scientific claim e.g. a book, newspaper or magazine article, or TV "documentary" relevant to a topic area of this course. It could be a promotional brochure for a product that the seller claims is scientifically valid e.g. Laser acupuncture helps smokers quit. Echinacea cures colds or Magnetic insoles cure arthritis.

The promoters of the item you choose to critique must claim that it is a **true account, a truthful advertising assertion** or a **scientifically tested claim** that can be (broadly) **related to any of the topic areas in this course**. Religious claims based solely on faith would not be appropriate as metaphysical claims cannot be tested or supported with evidence. On the other hand, the power of prayer on plants would be a fair target, because it makes an empirical claim and is thus subject to the rules of evidence and logic.

Select a claim to critique that interests you; it is easier to research and write on a topic that fascinates (or annoys) you or has a personal meaning. Feel free to give the context why the topic interests you. If you're not sure about a topic, Dr. Buxton and Alissa are happy to discuss.

Check out the supermarket tabloids, magazine ads, TV infomercials etc. The internet is a good source for dubious claims. Have you typed a term into your search engine, hoping to find objective information, only to find that the majority of the "hits" are for web pages maintained by commercial interests hoping to sell you something, rather than inform you?

Other useful websites for ideas include:

<http://www.csicop.org/> takes you to the Skeptical Inquirer.

<http://m.snopes.com/> gives a wide range of urban & other legends.

<http://www.quackwatch.com> aims to "combat health-related frauds, myths and fads"

### **Your critique should:**

1. State clearly and specifically what the author, advertiser, or documentary producer is asserting. What are we being asked to believe? Who is the claimant and what is his/her motivation)?
2. Summarize what evidence s/he puts forth in favor of those claims or interpretations.
3. Evaluate that evidence using the principles outlined by Sagan and Lett in your readings and other relevant principles from readings and lectures.
4. Say what evidence is missing that might persuade you if it were there.
5. Evaluate the logic of the arguments being made by the proponent of the theory or product being promoted in your target item.
6. Search the scientific literature for data that would support or refute the proponent's claims and summarize it briefly in your paper.
7. Come to a conclusion about the probable veracity of the claim(s) being made.

To guide your critique, use the principles of evaluation contained in Carl Sagan's article on "baloney detection" and Lett's "Field Guide to Critical Thinking". Where possible, relate your critique to some of the major themes of the course e.g. the importance of objective evidence to back up claims, the contaminating influences of wishful thinking, and the influences of ideological beliefs or political interests on decision making. If the background, beliefs and economic interests of the proponent are relevant, say so.

Papers will be graded on how you select and integrate information from the readings and lectures to support your arguments. You will also be graded on the logic, coherency and organization of your essay. If appropriate to your target claim, show how errors of perception, memory, and inference discussed in the course may have led to belief in a false claim. You will spell out the underlying grounds for the disagreement and the current state of knowledge in relevant academic areas to reach a well-supported conclusion. The best answers will give examples from the course materials that demonstrate you understand them and their relationship to one another.

Some dubious claims turn out to be true. If your choice turns out to have good evidence in its favour, say that it has withstood your careful scrutiny. That's fine if the evidence is really there. In some cases, there will be evidence for and against. If it is too soon to make up your mind because all the relevant data are not yet in, conclude that we should suspend judgment at this time, pending further investigation.

Remember: the burden of proof is on the claimant. You don't have to accept his/her claim if you don't see sufficient evidence, but you may wish to not reject it at this time either. Occasionally, things that seem highly unlikely are eventually proved true. Be open-minded, but don't be gullible. Even if you conclude the claim is unsupported, don't accuse anyone of fraud or cheating unless there is strong evidence to back up the accusation.

**An example of paper:**

Arneja S, An approach to critical thinking for health care professionals. (2007) BCMJ 49 (10) 547-549. <http://www.bcmj.org/approach-critical-thinking-health-care-professionals>