

**LABMP 590: Technology and the Future of
Medicine** ECHA 1-451, Tuesday & Thursday 2:00 - 3:20 pm
Winter 2019

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<http://youtu.be/AyYnQrOARvM>

Course Description

General Description:

LABMP 590 is a lecture and seminar course describing the future effects of technology on medicine in both the developed and developing world, the promise and perils of biotech, nanotech, and artificial intelligence, the changing character of research and practice of medicine and pathology in the coming decades, and the technological singularity. **Each student will carry out a final project supervised by a faculty member and give a presentation.** This course is designed for graduate students in the Faculties of Medicine and Dentistry, Science, Business, Engineering, Nursing, or Arts, and is open to undergraduates in those Faculties with consent of Department.

While designed for graduate students, the course may also be taken by undergraduates with permission of the instructor, and it may also be used for continuous professional learning by faculty and staff. The course is self-contained, the basic background for understanding the concepts is taught to the students within the course, so that their varying educational background will not inhibit full participation in the course. Although every lecture fits within the concept of "[medicine writ large](#)" **a medical background is not required to take the course.** Five of the twenty-two lectures assume some knowledge of medicine but are easily understood by students without such a background.

This interactive seminar discussion course for students in the sciences, medicine, and the arts takes an even-handed approach to the influence of technology on the future of medicine, with both technology advocates and technology skeptics presenting. The objective of the course is to provide a balanced idea of the promise and peril of technology in medicine and to instill the

idea that we are not passive victims of the future, but with appropriate education can actually help shape the future in positive ways. The course debates both the promise of elimination of disease by technology and the possibility that a host of new diseases will be brought about by technology. It also considers the future influence of technology on the have-nots in the world who have yet to make their first phone call. The technological Singularity and possible “merger” of humans and machines are considered along with the idea that “the future is already here, it is just not uniformly distributed”. The ways in which technology has already changed pathology, medicine and medical research will be covered, as well as the likely changes in medicine over the next decades. Existential risks and likely medical advances in the areas of biotech, nanotech, and artificial intelligence will be considered. Regenerative medicine/tissue engineering is given detailed consideration.

The course is taught in a highly innovative way by a distinguished group of faculty coming from a variety of different disciplines and backgrounds, representing the best and the brightest from across the campus. Lectures and discussion in the course are captured in broadcast quality video (Youtube channel [Kim Solez](#)). The course is heavy on philosophy, ethics, and the description of likely future scenarios. Existential risks and doomsday scenarios are discussed as well as possible utopian outcomes. The course is broadly conceptual. It discusses nanotechnology, biotechnology, genomics, and artificial intelligence and their impact on medicine now and in the future but it is not a course about practical aspects of new laboratory techniques to be used at the research bench. In the latter portion of the course there is a detailed exploration of regenerative medicine/tissue engineering and stem cell generated organs as a solution to end stage organ failure.

Course Format:

Each 80-minute class period on Tuesdays and Thursdays will be divided up into approximately 60-minute lecture, and 20-minute whole class discussion. **Each student will take on a special project of their own with guidance by the faculty and present the results of that special project/research investigation in the latter portion of the course.** To avoid consuming regular class time with student presentations, the presentations may be given in special student presentation evenings scheduled at a time convenient for the students and mixed with food, entertainment, and social events. One such evening or class period can be scheduled approximately midway in the

semester so students who wish can give their presentation early can do so.

Course Evaluation and Deadlines:

Students will be evaluated on their presentation on their chosen project in the course (30%) (live or as video), a paper on that project (40%), a multiple choice and short answer midterm exam on the basics of the subject matter in the course given on March 5th (covering material through February 28th, plus the last 8 minutes of [Dr. Jonathan White's TEDx talk](#)) (20%), and class participation (10%).

Final Presentation	30%
Final Paper	40%
Midterm Exam	20%
Participation	10%

Students should pick a mentor and a final paper topic **by March 12th** and inform Dr. Solez at kim.solez@ualberta.ca. The paper is **due April 2nd** and should be 3,000 to 4,000 words excluding references (10-13 pages). The final paper and presentation must be on a subject directly related to one of the main themes of the course such as exponential change, the technological Singularity, artificial intelligence, nanotechnology, genomics, replacement of human labor by machines, existential risk, and medical ethics of the future. *A topic that is simply technology and medicine, and does not have futuristic or exponential orientation, does not meet course requirements.*

On the first day of the course a short not-for-credit quiz will be given to assess the knowledge of course material that the students possess when beginning the class. The subject matter of this quiz is similar to the mid term exam March 5th. Students should be able to define the technological Singularity, Moore's Law, medicine writ large, existential risks, and the accessible future. The Singularity has many definitions and students can pick the one they like the best. One of the aims of the course is to be able to define these terms and discuss them intelligently. Students are also expected to watch the last 8 minutes of Dr. Jonathan White's TEDx talk (<https://www.youtube.com/watch?v=TRbErYIUvS4>) from minute 6:40 on, and know the main points for the midterm.

To accommodate shy students, participation on online forums related to the course can also count toward the class participation grade, and during class the students also have the option of texting their questions to Dr. Solez and having him ask them out loud without revealing the identity of the questioner. The texting should be conducted over University WiFi with phones on Airplane mode and not using a cellular connection. Cell phones can produce interference that interferes with the audio track of the video recording.

Evaluation Grading in General:

Grades will reflect the degree to which written and in-class activities exemplify work that is organized, rigorous, and critically analytical. Course products must also demonstrate an ability to integrate theory and practice, and to understand the main themes of the course.

Written assignments are recommended to use APA (American Psychological Association) style although we are flexible on format. Regardless of reference style, *it is important to reference sources accurately*. The effort to use an appropriate academic style helps structure and present academic work in a clear and accurate manner. Moreover, it respectfully acknowledges the contributions of author-researchers whom you have used to strengthen your presentation and arguments. You can access information about the APA Style Manual and associated guides by using this site: <http://www.apastyle.org/>

Evaluation Criteria:

Course participants will have the opportunity to demonstrate their understandings of the main course themes through the written assignments, presentations, midterm exam and class discussions.

For the **final paper due April 2nd** the following checklist will be used for evaluation: (Points out of 100)

1. Title accurately reflects your research topic. / 5
2. The topic is appropriate to course themes and shows understanding of those themes. /15
3. The topic is clearly defined in a manner that would be clearly understood by a general audience. /15
4. The paper is well organized. /15

5. General background is provided to give context. /10
6. Opinions are put forward which are innovative and well argued. / 25
7. References are cited next to appropriate text and provided in a reference list. /10
8. The paper is reasonably free of errors in spelling, grammar, formatting problems, and typos. /5

Five points a day will be deducted for late work.

For the **student presentations** the following checklist will be used for evaluation: (Points out of 100)

1. The presentation is insightful and shows good understanding of course themes. / 25
2. The presentation is well prepared, easily understood, and enjoyable to listen to. /25
3. The presentation is well organized and makes good use of visual aids and/or video. /10
4. Opinions are put forward which are innovative and well argued. /25
5. Image sources are provided for the images used in the oral presentation linked to copies of the images. /10
6. The presentation slides are reasonably free of errors in spelling, grammar, formatting problems, and typos. / 5

To accommodate the possibility of shy students taking the course, the option is available to all students of preparing a 20-minute video of their presentation with a videographer and presenting that to the course rather than a live presentation. Such a video presentation would be graded the same as a live presentation, and there still would be a live 10 minute question period. Many students consider the live presentation in the course to be a very valuable experience, and we continue to believe that from the student's point of view the live presentation gives the optimum experience for the student.

Example Student Presentations:

<http://www.youtube.com/watch?v=ZJRrcloou9Y>

<http://www.youtube.com/watch?v=LNg0luyfGE>

<http://www.youtube.com/watch?v=2Gx-JiUtZks>

Example written papers are available upon request.

General Policies:

Audio or video recording of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Recorded material is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the instructor. Policy about course outlines can be found in Section 23.4(2) of the University Calendar.

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (on line at <http://www.governance.ualberta.ca/en/CodesofConductandResidenceCommunityStandards/CodeofStudentBehaviour.aspx>) and avoid any behavior which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University. (GFC 29 SEP 2003)
Text matching software is used in evaluating student papers; students will be provided with reasonable alternatives if they object to their materials being stored in a database.

For further information:

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