

Syllabus: PSYO 7701.03 RADIANT Seminar

Instructor: Aaron J. Newman, PhD

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Rationale

This course is a component of the Rehabilitative and Diagnostic Innovation in Applied Neurotechnology (RADIANT) program at Dalhousie University. This program departs from traditional science training by placing a heavy emphasis on the process of *innovation* — identifying problems that represent real needs in society, and creating novel, neurotechnology-based solutions that not only work, but that can actually reach the people who can benefit from them, in a form they can use. The core goal of RADIANT is to *produce HQP who have proven skills in both neuroscience/neurotechnology, and the professional skills needed to work in clinical and industrial settings to design solutions that meet a real need and have the potential to be commercialized or otherwise make it into the hands of people who can benefit from the solutions.*

The RADIANT seminar is designed to provide training in:

1. Core scientific and technical aspects, and recent developments, of neurotechnology used in clinical diagnosis and treatment;
2. The basic pathology, clinical manifestations, diagnosis, and treatment of prevalent nervous system disorders to aid in needs-finding and solution-building;
3. Core professional skills including
 - Clinical and research ethics;
 - Commercialization;
 - Intellectual property;
4. The ability to communicate scientific information to scientific, journalistic, and lay audiences. Communication is an essential skill in science as in most areas of professional and personal life. This course is based on the premise that communication of scientific information must be accurate, but that it must also be convincing. There is a difference between simply conveying information, and shaping the content and delivery of the desired information to the intended audience.

Prerequisite

Instructor's permission.

Learning Objectives

This course will build learners' skills in innovation and communication. At the end of this course, students should be able to:

- Demonstrate an integrated understanding of neurotechnology and its applications to the diagnosis and treatment of nervous system disorders;
- Design a research study involving clinical populations, demonstrating an understanding of the principles of diagnosis and rehabilitation, as well as how outcomes are measured;
- Define and explain core principles of intellectual property such as different types of patents in the Canadian, U.S., and other systems, how patents are claimed and defended, and how intellectual property may be licensed;
- Analyze an ethical issue raised by the use of neurotechnology in research or applied contexts, with reference to relevant ethical guidelines (e.g. the TCPS) and important legal precedents;
- Demonstrate an understanding of how to effectively communicate with different audiences — including scientists, clinicians, patients, journalists, lay people — by actually doing so in written and/or oral forms.

Evaluation Components

Because the content of this seminar will vary from term to term, the specific nature of the evaluation components will vary accordingly. In any given term, the final grade will be based on 3 assignments, plus a participation grade, each worth 25% of the final mark. Below the details of the participation grade, as well as examples of other assignments that might be assigned, are provided. Other assignments would be similar in nature, e.g., a 1000 word essay on a topic covered in the seminar.

Participation

25%

- This portion of the final grade will be divided by the number of seminars for the term, and equal weight will be placed on attendance and actively contributing to the discussions. Absences will be excused only through written agreement of the instructor, and will typically require documentation such as a doctor's note.

Neurotechnology in Clinical Neuroscience 25%

- A written article of less than 1000 words, written for a lay audience describing a real or possible application of neurotechnology to a nervous system clinical problem

Ethics 25%

- Provide a short (~1000 word) analysis of an ethical issue related to neurotechnology.

Scientific Communication 25%

- A 10 minute talk (accompanied by any visuals or demonstrations desired) describing a research project they have conducted.

Communication to a Non-Scientific Audience 25%

- Each individual will give a an oral presentation describing their research to a lay audience. This may take any number of forms such as to a science camp, a patient group, a school class, etc.. This presentation should be video-recorded for the purposes of evaluation.

Outline and Schedule

NOTE: The schedule and assigned readings will vary from year to year according to availability and schedules of invited speakers. The following is a list of general topic areas and examples of possible specific topics.

1. Overview of the class
2. Clinical Neuroscience, covering one or more of the following topics:
 - Pathology and etiology
 - Principles of diagnosis
 - Principles of treatment and rehabilitation
 - Assessing outcomes
 - Specific diseases, such as:
 - Alzheimer's disease
 - Parkinson's disease
 - Multiple Sclerosis

- Hearing disorders
 - Epilepsy
 - Psychosis
 - Addiction
 - Stroke
 - Autism
3. Neurotechnology, including
- fMRI
 - DTI
 - MEG
 - EEG
 - TMS
 - Software for cognitive enhancement and rehabilitation
 - Pharmacology
4. Neuroethics (Including contributions from Michael Hadskis, Health Law Institute)
- Ethical considerations in neuroimaging
 - Clinical ethics
 - Ethical implications of neurotechnology
5. Commercialization
- Guest lectures from successful entrepreneurs
 - Guest lectures from funding agencies and industry development organizations (including BioNova and INNovaCorp)
6. Intellectual property (coordinated with Dalhousie ILI)
- What is IP
 - Forms of IP protection
 - Protecting and respecting IP in academia and industry
7. Communication
- Scientific Writing¹
 - Designing and delivering effective presentations^{2,3,4}
 - Graphic design for scientific communication^{5,6,7}
 - In-class presentations: Oral presentations
 - Social media^{8,9}

¹ Silvia, P. (2007). *How to write a lot*. American Psychological Association

² Reynolds, G. (2007). *Presentation Zen*. New Riders Press

³ Reynolds, G. (2010). *The Naked Presenter*. New Riders Press

⁴ Duarte, N. (2010). *Resonate: Present Visual Stories that Transform Audiences*. Wiley

⁵ Reynolds, G. (2009). *Presentation Zen Design: Simple Design Principles and Techniques to Enhance Your Presentations*. New Riders Press

⁶ Duarte, N. (2008). *Slide:ology: The Art and Science of Creating Great Presentations*. O'Reilly Media

⁷ Tufte, E. *The visual display of quantita-*

- In-class poster day
- Communicating with patients
- Communicating with journalists
- Communicating with a lay audience

Academic Honesty & Plagiarism

Dalhousie University defines plagiarism as the presentation of the work of another author in such a way as to give one's reader reason to think it to be one's own. Plagiarism is a form of academic fraud. Plagiarism is considered a serious academic offense which may lead to the assignment of a failing grade, suspension or expulsion from the University, or even the withdrawal of a degree previously awarded. Some examples of plagiarism are:

- The use of a paper purchased from a commercial research corporation or prepared by any person other than the individual claiming to be the author;
- Copying another student's work. You are free and indeed, encouraged, to work in groups on course assignments. However, each student will be graded individually (unless you are explicitly told otherwise, as in group assignments) and therefore each student is expected to write his or her own answers;
- Copying, without giving credit to the author, from another's published or non-published works, another's computer codes/programs, another's artistic or architectural works, another's scientific project, including material found on the internet;
- Copying a direct quotation from another source without indicating that it is a direct quote through the use of quotation marks and source page numbers;
- Submitting a piece of work for credit in more than one course without written permission of both course instructors;
- Submitting the same piece of work more than once in the same class, including in different years.

Dalhousie University's policy on intellectual honesty can be viewed at: www.registrar.dal.ca/calendar/ug/UREG.htm#12. As well, the Faculty of Graduate Studies has regulations concerning intellectual property, which may be accessed at dalgrad.dal.ca/regulations/v. As per Dalhousie policy, any suspected cases of academic dishonesty will be reported to the Senate Disciplinary Committee for review. Please do not hesitate to ask your instructor or the Faculty of Graduate Studies

if you have any questions concerning what might or might not be considered academic dishonesty.

Student Accessibility Services

Students with disabilities are encouraged to register as quickly as possible at the Student Accessibility Services if they wish to receive academic accommodations. To do so please phone 494-2836, email access@dal.ca, drop in at the Mark A. Hill Accessibility Centre or visit their website www.studentaccessibility.dal.ca All forms are now available on their website.

References

- Duarte, N. (2008). *Slide:ology: The Art and Science of Creating Great Presentations*. O'Reilly Media.
- Duarte, N. (2010). *Resonate: Present Visual Stories that Transform Audiences*. Wiley.
- Godin, S. (1999). *Permission Marketing*. Simon & Schuster.
- Kawasaki, G. (2011). *Enchantment: Art of Getting People to Do What You Want*. Penguin.
- Reynolds, G. (2007). *Presentation Zen*. New Riders Press.
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- Silvia, P. (2007). *How to write a lot*. American Psychological Association.
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