

BRANDEIS UNIVERSITY "SPLASH" 2019
(S222) **Frontiers in Neurological Surgery**
Syllabus: Revised January 4, 2019

"I would like to see the day when somebody would be appointed surgeon somewhere who had no hands, for the operative part is the least part of the work."



"There is only one ultimate and effectual preventative for the maladies to which flesh is heir, and that is death."

—Harvey Cushing, MD (1869–1939),
pioneering neurosurgeon

Time: SATURDAY, FEBRUARY 2, 2019: 2:00 p.m. – 3:00 p.m.
I will also be available after class from 3:00 p.m. to 4:00 p.m. (location TBA)

Location: BROWN SOCIAL SCIENCE CENTER, ROOM 316
This building is located near the remnants of Usen Castle, across from the Usdan Student Center and the University Libraries. You can find the location using the interactive campus map at: <https://www.brandeis.edu/about/visiting/map.html>

Instructor: Matt Stenerson
(mstenerson@brandeis.edu)

About me: Hi, everyone! I am very excited to be teaching this course and look forward to meeting you all in February. I am currently a senior at Brandeis in the neuroscience BS/MS program. I work in the Marder Lab, and the topic of my master's thesis pertains to quantitation of neuron morphology. I hope to attend medical school after college—perhaps like some of you! In addition to this course, I am also teaching S223: Introduction to Human Cardiology. Please feel free to reach out to me by email with any questions.

Overview: I know that this is just a one-day, fun, exploratory course—and I hope that you all don't find this to be a drag—but the nature of this course topic is not one easily covered in an hour. In the interest of your own learning, I am “assigning” you to read two primary research papers (around ten pages total, although the material is quite dense). These are peer-reviewed papers published in neurosurgical journals. For some of you, this may be the first time reading a paper like this. **Please do not worry if you do not understand everything;** this material is advanced and is meant to be challenging. Efficient reading of primary research takes practice, and if you decide to pursue higher education in a scientific field, you have *plenty* of practice in your future. For now, please just try your best to understand the readings, and feel free to ask me any questions by email.

The two required readings are:

1. Romeike, B. M. F., *et al.* (2015). Coherent anti-Stokes Raman scattering and two photon excited fluorescence for neurosurgery. *J. Clin. Neurol. Neurosurg.* 131, 42–46.

The first paper deals with a spectroscopy technique known as coherent anti-Stokes Raman spectroscopy (CARS). I will explain CARS more in depth during our class time. In the meantime, if you don't understand something in the paper, I encourage you to look it up and try your best. At the same time, please don't stress over it; it is only meant for your own learning (and hopefully enjoyment).

2. Swanson, K. I., *et al.* (2015). Fluorescent cancer-selective alkyl-phosphocholine analogs for intraoperative glioma detection. *J. Neurosurg.* 76(2), 115–124.

The second paper deals with the development of a tumor fluorescence for intraoperative detection. The surgical treatment of brain tumors, including gliomas, is greatly inhibited by the inability to visually discriminate all diseased tissue from healthy nervous tissue. Various fluorescence methods have recently been developed to improve visualization during surgery.

Some other papers have also been provided which are not required reading, but I thought some of you may find them interesting. Many of the selected papers are written by prominent neurosurgical specialists, and are, in my opinion, good examples of their own topic. The subjects include:

- GLOBAL NEUROSURGERY
 - Albright, 2016 (recommended) – Dr. A. Leland Albright is one of the best-known pediatric neurosurgeons in the world and has spent much of his career practicing neurosurgery and educating neurosurgical staff in Africa.
 - Leidinger et al., 2018 (*supplemental*)
- NANOTECHNOLOGY IN NEUROSURGERY
 - Mattei & Rehman, 2015 (**highly recommended**)
 - Elder et al., 2008 (*supplemental*)
- ROBOTICS IN NEUROSURGERY
 - Doulgeris et al., 2015 (*supplemental*)
- FUTURE OF CRANIAL NEUROSURGERY
 - Buttrick et al., 2017 (*supplemental*)
- ETHICAL CONVERSATIONS IN NEUROSURGERY
 - Menon & Riskin, 2015 (*supplemental*)

Quiz:

Upon completing this course, there will be a competition in the form of an optional quiz. The person with the highest score will win a \$25 Starbucks gift card (which will be mailed to you or available for pickup at Brandeis). The quiz will be administered as a Google Form and will be open-note; any material from the course as well as any material found online may be referenced. **I ask that you please work on this independently.** The quiz will open at 6:55 p.m. on Saturday, February 2 (the day of class) and will close at 11:55 p.m. the same night. Once you submit the quiz, you will not be allowed to revise your answers.

NOTE: The rigor of the quiz will reflect that of a college-level science class, so don't panic if you find it difficult! Content of the quiz will draw from the required readings and course discussion topics.