The New Neuroimmunology (3 Credits)
Spring Semester 2016
Temple University

Time: Weds 5:30 PM-8 PM
Location: Bio-Life 342

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Overview:
It is now recognized that there is extensive communication between the immune and nervous systems. This course will examine the mechanisms and effects of this communication. Potential topics include effects of immune molecules on neuronal synaptic structure and function over the lifespan, and the implications for learning and memory; the biological basis of sickness behavior and links to depression and PTSD; possible effects of the microbiome on brain development and function; and links between immune deregulation and neurodegenerative disease.

Prerequisites:
This course will draw heavily from contemporary scientific literature and will be most appropriate for students who have completed BIOL 3352 with a grade of B or better. BIOL 3358 and or BIOL 3361 would also be helpful. This course will be considered as a Neuroscience elective.

Readings and Resources:
This course will draw heavily from contemporary scientific literature, supplemented by online resources (Ex. videos, animations, micrographs, etc). Readings and links to supplemental materials will be posted on the class Blackboard site. It is critical that you do the reading and review the online materials prior to class.

Some good supplemental sources for background reading include:


Course Format:
This course meets once per week. The first part of the class will be devoted to a presentation.
that will provide a general overview of the topic and an introduction to the material presented in the readings, etc.; this will be followed by a group discussion.

For most classes, there will be one or two assigned readings and or videos drawn from or based on the contemporary scientific literature. The materials to be discussed will be posted on the course site on Blackboard. Students will take turns preparing a brief introductory lecture about the materials assigned for the week; they will also help to facilitate the class discussion that follows. All of the students should carefully read and review the assigned materials in order to be able to comment about them during class. The discussions of these materials will focus on the main issues rather than small details, specially emphasizing important issues and advances, and unresolved questions or the discrepancies in the field. Students will be evaluated based on their ability to present information, the clarity of thought displayed in considering information, and their participation. During presentations, all students are encouraged to ask questions and help to clarify and or elaborate on the important points presented. Everyone is expected to participate in every class.

**Grading:**

There will be three components that will be used in determining the grade for this course:

a. Class participation (1/3): Be an active learner. Come to class prepared, ask critical questions and participate actively in the discussions. Seek additional sources of information to supplement the assigned materials, particularly when terminology or technical components are unfamiliar or unclear.

b. Facilitating discussion (1/3): Prepare a short Powerpoint presentation introducing the week's topic and help to direct the class discussion (1/3). Strive to foster not only an understanding of key points of the readings, but also how they interrelate with other readings and/or class discussions.

c. Paper (1/3): 10 pages on a neuroimmunology-related topic of your choice (subject to instructor approval). The paper will be due the two weeks before the end of class. Assistance with many aspects of writing is available through the Temple University Writing Center [http://www.temple.edu/writingctr/support-for-writers/index.asp](http://www.temple.edu/writingctr/support-for-writers/index.asp)

**Please note:** The presentations and paper are intended in part to demonstrate your ability to find and process information about the topic of interest. However, they are also intended to demonstrate your ability to think critically about this information. You may to refer to any legitimate written source (with a heavy emphasis on peer-reviewed work from scientific journals), but your work should not be plagiarized. You should clearly cite your sources - if you are not clear where these boundaries lie, please ask!

More specific guidelines on how participation, presentations and papers will be evaluated will be outlined in class and posted on Blackboard.
A Tentative Schedule (some substitutions or additions may be made depending on student interests)

January 14  Introduction to Neuroimmunology. What is neuroimmunology? Why are interactions between the immune and nervous systems important? How are new discoveries expanding and reshaping our understanding of neuroimmunology?

January 21  A (very) brief overview of the immune system (I).

Assignment:
We are going to attend mini-med school course in immunology to learn:

1. *How the Body Fights Infection* (featuring Dr. Richard Locksley, Professor of Microbiology and Immunology at the University of California, San Francisco): [https://www.youtube.com/watch?v=ftCjTZ1J03Q](https://www.youtube.com/watch?v=ftCjTZ1J03Q)

January 28  A (very) brief overview of the immune system (II).

Assignment:
We are going to attend another mini-med school course in immunology to add to our knowledge of:

1. *Basic Immunology: Nuts and Bolts of the Immune System* (featuring Dr. Anthony DeFranco, Professor of Microbiology and Immunology at the UCSF): [https://www.youtube.com/watch?v=mFNxXfwIP3A](https://www.youtube.com/watch?v=mFNxXfwIP3A)

February 5  Communication Between the Immune System and the Brain: Sickness Behavior and Its Implications (I)

Assignment:


February 11 Communication Between the Immune System and the Brain: Sickness Behavior and Its Implications (II)

Assignment:

1. *From inflammation to sickness and depression: when the immune system subjugates the brain*: [http://www.nature.com/nrn/journal/v9/n1/full/nrn2297.html](http://www.nature.com/nrn/journal/v9/n1/full/nrn2297.html)

February 18  Let's get cellular: Microglia and the response to infection or injury
Assignment:

February 25  Neuroimmunology in Aging

Assignment:

1. Immune Activation in Brain Aging and Neurodegeneration- Too Much or Too Little? [http://ac.els-cdn.com/S0896627309006771/1-s2.0-S0896627309006771-main.pdf?tid=779bc8be-34a4-11e5-9418-00000aab0f26&acdnat=1438031849_a0a093cda93ef486b2a0a9713885c3f0](http://ac.els-cdn.com/S0896627309006771/1-s2.0-S0896627309006771-main.pdf?tid=779bc8be-34a4-11e5-9418-00000aab0f26&acdnat=1438031849_a0a093cda93ef486b2a0a9713885c3f0)

March 4  SPRING BREAK

March 11  Neurodegenerative diseases I (Alzheimer's disease)

Assignment:

1. Alzheimer Mechanisms and Therapeutic Strategies [http://ac.els-cdn.com/S0092867412002784/1-s2.0-S0092867412002784-main.pdf?tid=14e5a4a8-34a7-11e5-94c2-00000aacb35e&acdnat=1438032972_8980f9f708bfe4efd4cef5e7d42a1e9e](http://ac.els-cdn.com/S0092867412002784/1-s2.0-S0092867412002784-main.pdf?tid=14e5a4a8-34a7-11e5-94c2-00000aacb35e&acdnat=1438032972_8980f9f708bfe4efd4cef5e7d42a1e9e)

March 18  Brain Trauma and Inflammation: Links to Depression, PTSD, and Neurodegenerative Processes

Assignment:


March 25  Neurodegenerative diseases II (Parkinson's disease)

Assignment:


April 1  Early Life Infections and Development

Assignment:
1. Maternal immune activation and abnormal brain development across CNS disorders: 

April 8  The Gut Microbiome and Interactions with the Nervous System

Assignment:

1. Gut Microbes and the Brain – A Paradigm Shift in Neuroscience: 
   http://www.jneurosci.org/content/34/46/15490.full.pdf+html

April 15  Pain

Assignment:

1. The neuropathic pain triad- neurons, immune cells and glia: 

April 22  Sleep, memory and the immune system

Assignment:

1. The rhythm of rest and excess: 
   http://www.nature.com/nrn/journal/v6/n5/full/nrn1670.html

Temple’s Policies on:

Civility & Code of Conduct (COC): Please be punctual. If you are late for class, enter as unobtrusively as possible. Violations of the COC include, but are not limited to: academic dishonesty and impropriety, such as plagiarism and cheating; interfering or attempting to interfere with or disrupting the conduct of classes or any other normal activities of the University.

Disability Disclosure: Any student who has need for accommodation based on the impact of a disability should contact Dr. Patterson to discuss the specific situation as soon as possible. Also, the student should contact Disability Resources http://www.temple.edu/studentaffairs/disability/.