NEUR502-Basic and Clinical Aspects of Neuroimmunology

Instructors: Course coordinators: (by appointment, office hours)

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Guest lecturers: see course schedule

**Term of implementation:** Winter (2022)

**Credits:** 3 credits

**Location:** *This course will be online/delivered remotely.* In the situation that the Covid-19 pandemic has subsided, and if given permission by the Faculty of Medicine, this course might hold formal Face-to-Face classes. If so, these will be held in the Genome building (740, Dr Penfield), room 3001

**Time:** Tuesday 1:00pm-4:00pm (Montreal time)

**Pre-requisites:** At least one course from Immunology (MIMM 214 or MIMM 314 or MIMM414 or PHGY 313) and one course from Neuroscience (NSCI200 or NSCI210 or PHGY209 or NEUR310 or ANAT 321 or ANAT 323 or PHGY 314) are pre-requisites, or permission of instructor

**Note:**  
- Graduate students working on the topic of neuroinflammation are also eligible  
- A cap of 15 students applies

**Brief course description (from course calendar)**

The role of inflammation in physiological function of the nervous system, as well as in a broad range of neurological diseases where inflammation can act as a contributing factor to the development of pathology or promote recovery, including fundamentals of neuroimmunology to molecular/cellular aspects of neuroinflammation underlying the pathology seen in clinical conditions.

**Learning outcomes**

Upon completion of this course, students will be

- Introduced to the field of Neuroimmunology
- Exposed to the basic and clinical aspects of neuroinflammation
- Able to integrate and appraise the most updated knowledge of the involvement of inflammation in various neurological disorders
- Able to develop critical thinking and judgement on research outcomes
- Expected to have enhanced oral/written communication skills
- Able to design a neuroinflammation-related research project under the format of mock grant writing

**Instructional Methods:**

The course will consist of 1 session of introduction, 12 sessions of lectures with or without paper discussion, 3 grant workshops. In each lecture/paper discussion session, a lecture on the selected topic will be given by the instructor during the first 60 minutes. During the second part of the session (2
hours), students will make presentations on assigned reading materials. 1-2 students will be assigned as "presenters" for each class. The "presenters" will be required to prepare a power point presentation including a general introduction, figures/tables and a conclusion, and lead a discussion of the paper, with all students participating in the discussion. Students will be required to read, present assigned research papers, and participate in discussion on a weekly basis (when there is a paper discussion session). A review paper on the relevant topic will also be provided for background reading if needed (optional).

**Required course materials:**
Research articles for each session are listed in the course syllabus and uploaded in myCourses.

**Evaluation:**
There is no exam for this course; however, the evaluation process is as follow:

- Presentation, discussion and ability to critically analyse information will be assessed in each class (5% per each session). 12 sessions of lecture/paper discussion will made up 60%, then be converted to 50% of the total grade. Students’ performance on paper presentation/discussion will be communicated for the first 6 graded sessions after the session on Feb 15th.

  In an effective presentation/discussion, you should try to answer the following questions:
  - What are the authors trying to demonstrate?
  - What questions are they asking?
  - Why is this question worth asking?
  - What methods did they use to answer the question?
  - What did they find?
  - Did they succeed in answering their question?
  - Where do they go from here?

**Evaluation when there is lecture/paper discussion:**

<table>
<thead>
<tr>
<th>Preparation (1 point)</th>
<th>Presentation: (2 points)</th>
<th>Discussion: (2 points)</th>
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<tbody>
<tr>
<td>Students are required to read research article/s, send one question on the research article the day before the class (before 5pm) to the presenters on that week for in class discussion. Presenters will incorporate questions into the powerpoint on the appropriate slide, and send a summary of the questions to the course coordinators.</td>
<td>All students will be evaluated on their understanding and interpretation of the article. Presenting students will be evaluated on the introduction of the topic and the ability to lead the discussion. Non-presenting students will be evaluated on readiness/clarity to describe figures/tables in the research articles.</td>
<td>All students will be evaluated on their active participation in the discussion (raise questions and comments); the insight and critical thinking displayed during the lecture and the paper discussion.</td>
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- In cases where there is no paper presentation/discussion, the lecture discussion counts for 5%
- Mock grant writing and oral presentations will count for 50% of the grade.
• The grant will be prepared and presented as a team grant (~3 students/grant). The team will be assigned by the course directors after the add/drop deadline (Jan 18th).

• Three grant preparation workshops:
  o **Grant workshop I (Jan 25th) (5%)-Brainstorming and preparation of letter of intent (LOI).** 90 min group discussion + 30 min summary presentation of your LOI (one slide/team) to the group. A one page LOI /team should be submitted one week after the workshop I (Feb 1st) including group成员 names, PI/project title (if grad student).
  o **Grant workshop II (Feb 22nd) (5%): Team discussion and revision:** 2 days before the workshop, each member of the team will send a 2 page-draft of the rationale and experimental design of their specific aim to their team members. During the workshop, each member presents their parts and seeks for comments and suggestions from the peers. 90 min group discussion + 30 min summary presentation of your proposal (in progression version) (three slides/team) to the group.
  o **Grant workshop III (March 22nd) (10%): Peer Review:** To facilitate discussion during this workshop, each team should send a one page-summary reflecting what they are going to present, two days before the workshop to the group. At the workshop, each team will give an oral presentation of their proposed grant, including background, objectives, justification, experimental design etc. All students will act as reviewers to provide comments and suggestions. Constructive feedback could entail pointing out “novelty”: the significance and the impact of the project; and “feasibility”; refinement of hypothesis, refocusing ideas or concepts, appropriate choice of experimental approach, appropriate controls, statistical analysis methods etc. At the end of the in-class discussion, all students need to submit a short written feedback summarizing the strengths, the weaknesses and suggestions for their peers’ grants.

  **The objective of the three workshops are:** 1) to provide opportunities to learn and help each other to improve grants; 2) to stimulate critical thinking; 3) to provide opportunity to strengthen oral communication skills; 4) to experience the grant review process; 5) It is expected that feedback from this workshop is incorporated into final oral and written assignment. Detailed guidelines of grant writing will be provided during the first class.

  The final grant will be shared with peers by oral presentation at the last class. In addition, a written version will be submitted several days after the last class (April 18th) (25%). Late submission of team grants will have a penalty: 5/25 points per day up to 5 days. The grant will not be reviewed by the instructors if it is not submitted within 5 days post-deadline.

<table>
<thead>
<tr>
<th>Grant workshop (20%)</th>
<th>Grant writing (25%) (Evaluated by team members)</th>
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<tbody>
<tr>
<td>I (5%)</td>
<td>Summary: 5 Final written version: 20</td>
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<tr>
<td>II (5%)</td>
<td>-Thoughtful and respectful contribution to teamwork;</td>
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<tr>
<td>III (10%)</td>
<td>-Share responsibilities with team</td>
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<tr>
<td>Team discussion and generation of LOI</td>
<td>Team discussion on each specific aim</td>
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<th>Team discussion and generation of LOI</th>
<th>Team discussion on each specific aim</th>
<th>-Oral presentations (5) Clarity Synthesis Logic -In-class discussion and written</th>
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<td>I (5%)</td>
<td>II (5%)</td>
<td>III (10%)</td>
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McGill Policy Statements:

Language of Submission:
In accord with McGill University’s Charter of Students’ Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives. (Approved by Senate on 21 January 2009 - see also the section in this document on Assignments and Evaluation.)

Academic Integrity:
McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures” (see www.mcgill.ca/students/srr/honest/ for more information). (Approved by Senate on 29 January 2003)
### Overview of course schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assessment (% of the final grades)</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>Jan 11th</td>
<td>Course introduction, Grant writing/reviewing Clinical Aspects of Neuronflammation in Multiple Sclerosis</td>
<td>N/A 5%</td>
<td>Ji Zhang Jack Antel</td>
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<tr>
<td>Jan 18th</td>
<td>Neuroinflammation in depression and suicide</td>
<td>5%</td>
<td>Reza Rahimian</td>
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<td>Jan 25th</td>
<td>Microbiota and neurological disorders <em>Grant workshop I: Group brainstorming/LOI</em></td>
<td>5% 5%</td>
<td>Irah King Ji Zhang/Jo Anne Stratton</td>
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<td>Feb 1st</td>
<td>The neurovascular unit in Alzheimer’s disease and dementia</td>
<td>5%</td>
<td>Edith Hamel</td>
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<td>Feb 8th</td>
<td>Astrocytes as key components of the brain metastatic microenvironment</td>
<td>5%</td>
<td>Peter Siegel</td>
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<td>Feb 15th</td>
<td>Gut Brain Axis in Parkinson’s disease</td>
<td>5%</td>
<td>Samantha Gruenheid</td>
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<tr>
<td>Feb 22nd</td>
<td>Cerebral Spinal Fluid &amp; Brain Barrier Cells: Immune cell gateways <em>Grant workshop II: internal discussion/revision</em></td>
<td>5% 5%</td>
<td>Jo Anne Stratton Ji Zhang/Jo Anne Stratton</td>
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<td></td>
<td>Reading week (February 28th-March 4th)</td>
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<td>Mar 8th</td>
<td>Brain Imaging &amp; Neuroinflammation</td>
<td>5%</td>
<td>David Rudko</td>
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<td>Mar 15th</td>
<td>Inflammation and circadian rhythms Gut</td>
<td>5%</td>
<td>Nicolas Cermakian</td>
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<tr>
<td>Mar 22nd</td>
<td><em>Grant workshop III: Peer review</em></td>
<td>10%</td>
<td>Ji Zhang/Jo Anne Stratton</td>
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<tr>
<td>Mar 29th</td>
<td>Monogenic diseases and immunity</td>
<td>5%</td>
<td>Roberta La Piana</td>
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<tr>
<td>Apr 5th</td>
<td>Neuroinflammation in chronic pain</td>
<td>5%</td>
<td>Ji Zhang</td>
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<tr>
<td>Apr 12th</td>
<td>Perinatal infection and brain lesions <em>Final grant sharing by oral presentation</em></td>
<td>5%</td>
<td>Guillaume Sebire Ji Zhang/Jo Anne Stratton</td>
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</tbody>
</table>

Due date (April 18th 8pm) for final submission of mock grant (25%)
Course content:

- **January 11th:** Course Introduction, Grant writing (Ji Zhang)
- **January 11th:** Clinical Aspects of Neuronflammation in Multiple Sclerosis (Jack Antel)
  

- **January 18th:** Neuroinflammation in depression and suicide: evidence from animal models and postmortem investigations (Reza Rahimian)
  
  **Review article:** Microglia emerge as central players in brain disease. Salter MW, Stevens B. Nat Med. 2017 Sep 8;23(9):1018-1027. doi: 10.1038/nm.4397
  

- **January 25th:** Microbiota and neurological disorders (Irah King)
  

- **February 1st:** The neurovascular unit in Alzheimer’s disease and dementia (Edith Hamel)
  

- **February 8th:** Astrocytes as key components of the brain metastatic microenvironment (Peter Siegel)
  


- **February 15th:** Gut Brain Axis in Parkinson’s disease (Samantha Gruenheid)
  

  **Research Article:** Intestinal infection triggers Parkinson's disease-like symptoms in Pink1 −/− mice. Diana Matheoud, Tyler Cannon, Aurore Voisin, Anna-Maija Penttinen, Lauriane Ramet, Ahmed M Fahmy, Charles Ducrot, Annie Laplante, Marie-Josée Bourque, Lei Zhu, Romain Cayrol, Armelle Le...
February 22nd: Cerebral Spinal Fluid & Brain Barrier Cells: Immune cell gateways (Jo Anne Stratton)

**Review article:** Surface-in pathology in multiple sclerosis: a new view on pathogenesis?

March 8th: Brain Imaging and neuroinflammation (David Rudko)


March 15th: Inflammation and circadian rhythms (Nicolas Cermakian)


March 29th: Monogenic diseases and immunity (Roberta La Piana)


April 5th: Neuroinflammation in chronic pain (Ji Zhang)


April 12th: Perinatal infection and brain lesions (Guillaume Sebire)