BRIEF COURSE DESCRIPTION
Wednesday 1:00p-2:50p
This course is focused on understanding and evaluating the targets, molecular mechanisms, and physiological effects of specific environmental chemicals on the nervous system. This knowledge will be supplemented through outside readings and class discussions that serve to support the students’ understanding of the material and provide them with a real world perspective of neurotoxicology.

LIST SCHOOL LEVEL, DEPARTMENT, AND/ OR PROGRAM COMPETENCIES
Understand and describe biological and chemical factors and mechanisms that affect the neurological health of individuals, communities, and populations.
LIST LEARNING OBJECTIVES ASSOCIATED WITH THE COMPETENCIES

- Be able to describe the major stages and cellular events that underlie development of the nervous system and appreciate neurodevelopment as a vulnerable period of toxicant exposure
- Be able to describe and apply the targets, mechanisms of action, and physiological effects of neonicotinoid exposure on the nervous system
- Be able to describe and apply the effects of neuroinflammation on the central nervous system and how this impacts neurobehavior and disease
- Be able to describe and apply the targets, mechanisms of action, and physiological effects of metal exposure on the nervous system
- Be able to describe and apply the targets, mechanisms of action, and physiological effects of exposure to toxins derived from plants and animals
- Be able to describe and apply the targets, mechanisms of action, and physiological effects of drugs of abuse on the central nervous system
- Be able to describe and apply and understanding of the targets and mechanisms of action of natural toxins in therapeutic intervention

EVALUATION

Grading in this class will be based upon weekly written assignments and class participation

Assignment 1: Neurodevelopment and environmental toxicants 25 pts
Assignment 2: Neonicotinoid resistance and neurotoxicity 25 pts
Assignment 3: Peripheral inflammation and neurodegeneration 25 pts
Assignment 4: Toxic metal exposure and neurotoxicity 25 pts
Assignment 5: Cognitive enhancement and methamphetamine 25 pts
Assignment 6: Neuronal targets of natural toxins 25 pts
Assignment 7: Analgesic properties of natural toxins 25 pts

General: Each assignment will involve interaction with outside readings related to each lecture topic. Students will work with the lecture material as well as the outside reading in order to appraise specific questions related to each topic that will serve to enrich students' understanding of the material and relate to relevant human health and toxicological situations. Students will then draw upon and convey this information during class discussion. Students will be evaluated on their understanding of the material and their ability to integrate and apply it to human and public health settings. Readings and assignments related to each lecture can be found in Canvas, under the Modules and Assignment tabs, respectively. All assignments should be submitted via Canvas.

Assignment Expectations: Assignments should be submitted via Canvas (under the Assignment tab) by 8:00a on the day of the relevant discussion. Students are expected to thoughtfully and critically engage with the readings and assignment questions. Late assignments will loss 5 points from the assignment grade. Assignments turned in AFTER 1:00p on the day of the discussion will lose 15 points. Students are expected to thoughtfully and critically engage with the readings and assignment questions. Your answers should demonstrate your knowledge of the material and your ability to provide an articulate and thorough answer to the question. In general, a one or two sentence answer will not be sufficient to adequately address the question being asked. Instead, a more developed presentation will be required to demonstrate your understanding and thought process. This course is less focused on “right and wrong” answers. Rather, I am more interested in seeing how you are working with this information, thinking critically about it, applying it, and articulating it.
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<tr>
<th>Date</th>
<th>Topic</th>
<th>Instructor</th>
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<tr>
<td>Jan 17</td>
<td>Neurodevelopment and Neurotoxicity (Caudle)</td>
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<td><strong>Topics:</strong></td>
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<td></td>
<td>- General overview of stages of neurodevelopment</td>
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<td>- Vulnerability of specific stages to toxicants</td>
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<td>- The synapse as a target for neurodevelopmental alteration</td>
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<td>Jan 24</td>
<td>PBL: Environmental Toxicants and Neurodevelopment</td>
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<td><strong>Readings:</strong></td>
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<tr>
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<td>1). Exposure to organochlorines and ADHD</td>
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<td>2). <em>In vitro</em> PCB exposure and neurodevelopmental deficits</td>
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<td>Jan 31</td>
<td>Pesticide Exposure and Neurotoxicity (Caudle)</td>
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<td>- Molecular mechanisms of action of neonicotinoid and organophosphate insecticides</td>
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<td>- Neonicotinoid insecticide resistance</td>
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<td>Feb 7</td>
<td>PBL: Mechanisms of Action of Neonicotinoid Pesticide Resistance</td>
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<td><strong>Readings:</strong></td>
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<td>1). Neurodevelopmental disruption and organophosphate exposure</td>
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<td>2). Neurotoxicity of neonicotinoid exposure</td>
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<td>Feb 14</td>
<td>Toxicant-Induced Inflammation and Neurodisease (Caudle)</td>
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<td><strong>Topics:</strong></td>
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<td>- Role of microglia in neuroinflammation</td>
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<td>- Activation of neuroinflammation by toxicants</td>
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<td>- Contribution of peripheral inflammation in neurological disease</td>
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<td>Feb 21</td>
<td>PBL: Peripheral Inflammation and Neurodegeneration</td>
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<td><strong>Readings:</strong></td>
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<td>1). Progressive neurodegeneration with peripheral inflammation</td>
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<td>Feb 28</td>
<td>Metal Exposure and Neurological Damage (Caudle)</td>
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<td><strong>Topics:</strong></td>
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<td>- Lead exposure and cognitive impairment</td>
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<td>- Mechanisms of action of lead-induced neurological disease</td>
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<td>- Neurodevelopmental consequences of lead exposure</td>
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| Mar 7  | **PBL: Long Term Cognitive Effects of Neurodevelopmental Lead Exposure**                    | 1). Manganese exposure and neurodevelopmental deficits  
2). Lead exposure in Chicago public schools                                           |
| Mar 14 | **Spring Break (No Class)**                                                                |                                                                                             |
| Mar 21 | **Neurotoxicity of Drugs of Abuse (Caudle)**                                               | **Topics:**  
-Mechanisms of neurotoxicity of methamphetamine  
-Cognitive impairment following marijuana exposure  
-Cognitive enhancement with drugs of abuse |
| Mar 28 | **PBL: Neuronal Targets of Methamphetamine Neurotoxicity**                                 | **Readings:**  
1). Synaptic mechanisms of methamphetamine  
2). Ethical considerations of stimulant use for neuro-enhancement |
| Apr 4  | **Natural Toxins and Neurotoxicity (Caudle)**                                              | **Topics:**  
-Specific targets and actions of natural toxins  
-Mammalian and Plant-based toxins  
-Targets and mechanisms of marine toxins |
| Apr 11 | **PBL: Select Neurological Targets of Natural Toxins**                                     | **Readings:**  
1). Cyanobacteria, BMAA, and ALS risk in New England |
| Apr 18 | **Therapeutic uses of Neurotoxins (Caudle)**                                               | **Topics:**  
-Snake venom and pain relief  
-Analgesic mechanisms of cone snail venom  
-Scorpion venom and therapeutic interventions |
| Apr 25 | **PBL: Mechanisms and Analgesic Properties of Natural Toxins**                             | **Readings:**  
1). TBA |