PSYC*4470, Course Outline: Fall 2021

General Information

Course Title: Advance Topics in Behavioural and Cognitive Neuroscience

Course Description:
Is addiction a brain disease or is it a disorder of learned behaviour? Could addiction be a latent product of environmental experience that fundamentally alters neurobiology during development? Are there common mechanisms at the core of drug and behavioural addictions? Classic debates on the nature of addiction are rapidly evolving with new and fascinating findings from the frontiers of neuroscience. Answering such questions requires an interdisciplinary approach to understanding the mechanisms underlying addictive behaviour at multiple levels: the whole organism, its neural circuits, and cellular/molecular processes. This course will cover theories and evidence in behavioural and cognitive neuroscience research on addictive behavior from an interdisciplinary perspective focusing on three major models of addiction: the disease model, the learning model, and the neurodevelopmental model. In addition to the critical evaluation of research theory, methodology, and evidence, issues of medical, ethical, social, political significance will be discussed.

Credit Weight:
0.5

Academic Department (or campus):
Psychology

Semester Offering:
Fall 2021

Class Schedule and Location:
Tuesdays & Thursdays 1:00 pm – 2:20 pm in MINS 106

Instructor Information

Instructor Name: Dr. Laurie A. Manwell
Instructor Email: Email through Course Link only
Office location and office hours: Virtual (Zoom) Thursdays 3:00 – 4:00 pm

Course Content

Specific Learning Outcomes:

We will address the topic of addiction using both Socratic and Scientific methods with the following objectives:

1. Interdisciplinary Approach: Students will develop an interdisciplinary understanding of the mechanisms underlying addiction, from basic molecular processes within neurons to the neural pathways that regulate the body and determine individual behaviour and social interaction within environments. Students will be able to identify and explain mechanisms involved in the development and manifestation of addictive behaviour across three levels: whole organism, neural circuits, and cellular/molecular processes.
2. Scientific Literacy: Students will develop an understanding of the fundamental relationships between theory, hypothesis, methodology, and evidence across various models of addiction in the field of neuroscience. Students will be able to identify areas of congruence and incongruence across three major models of addiction: the disease model, the learning model, and the neurodevelopmental model.
3. Critical and Creative Thinking: Students will develop and apply the principles of critical thinking to scientific and other claims, including the ability to make objective, evidence-based arguments and identify and refute illogical arguments by challenging the assumptions underlying various belief systems. Students will be able to summarize and appraise the strengths and limitations of models of addiction and propose modified and/or novel frameworks for future research.
4. Transferrable Skills: Students will develop transferrable skills essential for academic and career success, including fundamental learning, memory, and metacognitive skills, knowledge synthesis, analysis, and application, independent and interdependent work ethics and practices, team collaboration and leadership skills, and personal and group integrity practices. Students will be able to demonstrate, practice, and refine all of these skills in the context of sharing, proposing, and defending ideas in the field of addiction research (e.g., oral, written, individually, and in groups).
5. Autonomous Learning: Students will develop autonomous learning skills and practice the fundamental principles of self-directed lifelong learning including the skills of self-driven direction, self-motivation, self-monitoring, self-regulation, and self-assessment, for personal growth and academic, workplace, and life success. Students may also acquire an overarching appreciation of how the neurophysiology of the brain encodes and integrates information about the physical, mental, and social domains of the human condition, thus creating neural 'maps of meaning', and the implications for individuals and society.

Lecture Content:

SCHEDULE OF TOPICS

Weeks	Topics	Required Readings	Optional Readings	Events
Week 1: Sept. 9	- Introduction to and Course Overview	- Syllabus (all)		- Getting to know each other - Sign up for presentations
Week 2: Sept. 14, 16	- Definitions of Addiction - Principles of Neuroplasticity	- Lewis (2015): pdf-1 - Kolb & Wishaw (1998)	- Scully (2004) - Boyd (2000)	- Brief brain structure and function review and overview of topics in behavioural neuroscience research
Week 3: Sept. 21, 23	- Competing Models of Addiction in Human and Animal Research: Disease, Learning, and Neurodevelopmental Models **- Presentations Start: 20%** **- Discussion Posts Start: 25%**	- Leshner (1997) - Levy (2013) - McCrory & Mayes (2015) - Heinz et al. (2018)	- Nestler (2001) - Deleuze et al. (2015)	- Presentations 1 - 4 in classes - All students must complete first discussion board post on readings
Week 4: Sept. 28, 30	- Competing Models of Addiction in Human and Animal Research: Disease, Learning, and Neurodevelopmental Models	- Heilig et al. (2021) - Satel & Lilienfeld (2014) - Ouzir & Errami (2016) - Popescu et al. (2021)	- Pickard et al. (2015)	- Presentations 5 – 8 in classes - All students must complete second discussion board post on readings
Week 5: Oct. 5, 7	- Challenges to Models of Addiction: Theory, Testing, and Evidence	- Volkow et al. (2016) - Lewis (2017) -Puetz & McCrory (2015) - Heather (2017)	- Heather (2018) - Volkow et al. (2016) Supplementary Appendix	- Presentations 9 – 12 in classes - All students must complete first discussion board post on readings
Week 6: Oct. 14	- Challenges to Models of Addiction: Theory, Testing, and Evidence **- Participation Mark 1: 15%**	- Heather et al. (2018) - Hall et al. (2017) - Snoek & Matthews (2017)	- Grifell & Hart (2018)	- Presentations 13 – 16 in classes - All students must complete second discussion board post on readings
Week 7: Oct. 19, 21	- Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation	- Spanagel (2017) - Feltenstein et al. (2021) - Leyton & Vezina (2014) - Fouyssac et al (2021)	- McEwen (2012)	- Presentations 17 – 20 in classes - All students must complete first discussion board post on readings

Weeks	Topics	Required Readings	Optional Readings	Events
Week 8: Oct. 26, 28	- Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation	- Shadur & Lejuez (2015) - McEwen et al. (2015) - Neophytou et al. (2019) - Christakis et al. (2012)	- Christakis et al. (2018) - Bilimoria et al. (2012)	- Presentations 21 – 24 classes - All students must complete second discussion board post on readings
Week 9: Nov. 2, 4	- Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation	- Hyman (2005) - Belin et al. (2016) - Everitt & Robbins (2013) - Lüscher et al. (2020)	- Scaplen & Kaun (2016) - Lüscher et al. (2021)	- Presentations 25 – 28 in classes - All students must complete first discussion board post on readings
Week 10: Nov. 9, 11	- Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation	- Murray & Bevins (2010) - Manwell & Mallet (2014) - Lapiz et al. (2003) - Koob & Schulkin (2019)	- Bouton (2002) - Manwell et al. (2009)	- Presentations 29 – 32 in classes - All students must complete second discussion board post on readings
Week 11: Nov. 16, 18	- Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation	- Perry & Pollard (1998) - Brady & Sinha (2005) - Menne & Chesworth (2020) - Burkett & Young (2012)	- McKenzie (2013) - McKenzie (2014)	- Presentations 32 – 36 in classes - All students must complete first discussion board post on readings
Week 12: Nov. 23, 25	- Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation	- Firth et al. (2019) - Crone & Konijin (2018) - Manwell et al. (2021) - Weirs & Verschure (2021)	- Christakis et al (2004) - Christakis (2009) - Cascio et al. (2019)	- Presentations 37 – 40 in classes - All students must complete second discussion board post on readings
Week 13: Nov. 30, Dec. 2	- Theory and Evidence for Cognitive-Behavioural Brain Reserve Across the Lifespan - Revolutions in Neuroscience: 100 Years From Now? **- Participation Mark 2: 15%** **- Research Essay (Dec. 3 @ 11:59 pm): 25%**	- Lewis (2015): pdf-2 - Fox et al. (2010) - Gelfo (2018)	- Giovacchini et al. (2018)	- Final discussions and Q & A, reflections on course, ideas for future research and other projects - Good luck on final exams and have a fantastic holiday!! ☺

Course Assignments and Tests:
Course Outline Guidelines: Checklist

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Discussion Post 1 & 2	**Week 4**	**5**	**1-5**
Discussion Post 3 & 4	**Week 5**	**5**	**1-5**
Participation Mark 1	**Week 6**	**15**	**1-5**
Discussion Post 5 & 6	**Week 8**	**5**	**1-5**
Discussion Post 7 & 8	**Week 10**	**5**	**1-5**
Discussion Post 9 & 10	**Week 12**	**5**	**1-5**
Participation Mark 2	**Week 13**	**15**	**1-5**
Presentation	**Weeks 2-12**	**20**	**1-5**
Research Essay	**Week 13**	**25**	**1-5**

Additional Notes for Formal Assessments:
This course is designed to engage students in an overview of key concepts, empirical approaches and theoretical perspectives in behavioural and cognitive neuroscience and the bio-psycho-social study of human and animal behaviour, including critical analysis of their significance and implications for research, medicine, individuals and society. Engagement and critical analysis are core components of this course and there will be a significant amount of reading, writing, discussion, and collaboration required to fully comprehend the content. This course requires autonomy, initiative, and innovation and students should carefully follow instructions for formal assessments as described in the course syllabus and marking rubrics to successfully complete the course. Students are required to have completed assigned readings prior to each assigned class and be prepared to participate in class discussions. To receive an A+, students must demonstrate a strong understanding of the course content as it relates to multilevel processes through exceptional analysis and application of concepts. In general, grades advance or drop depending on both content and style; for an A-/A/A+, the assignment must demonstrate exceptional thoughtfulness, reasoning, and presentation. “A” projects involve difficult and time-consuming work – and a tremendous investment in your education and development! A solid “B” is a mark of achievement which reflects critical reasoning and/or thorough research and solid writing skill. In cases of medical or otherwise compassionate circumstances, students should contact the instructor to determine what arrangements can be made to ensure that course requirements are met and students successfully pass the course.

Course Requirements for Final Grade:

1) **Participation/Professionalism: 30% (2 x 15%)**
   - Whole class participation in discussions
   - Assessed Weeks 6 & 13
2) **Discussion Forum Posts: 25% (5 sets x 5%)**
   - Weekly posts in assigned discussion groups in Weeks 3-12
   - Assessed Weeks 4, 6, 8, 10, & 12
3) **Presentation: 20%**
   - One individual presentation during lecture time: Weeks 3-12 inclusive
   - Presentation aids due 48 h prior to presentation (Dropbox) or 10% deduction
4) **Research Essay: 25%**
   - Final paper due: Dec. 3 @ 11:59 pm (Dropbox) (*No extensions; No exceptions*)

Lecture Participation and Professionalism: 30%

During assigned classes, students are expected to participate fully and in a professional manner; for example, reviewing assigned readings, offering and challenging ideas, asking questions and demonstrating interest and respect towards peers and their ideas. Assigned classes are mandatory and marks will be deducted if missed (e.g., if you arrive late and/or leave early). If you must miss a class, please contact the instructor immediately with the appropriate documentation and be prepared to make up any missed work. You are responsible for finding out what you missed and how to make up missed work. Students are to be respectful of and engage fully in the university learning environment as a place to demonstrate higher order thinking skills involving analysis, evaluation and synthesis of knowledge. Students will be formally assessed on Week 5 (15%) and Week 12 (15%). REFER TO APPENDIX A FOR MARKING RUBRIC

Discussion Forum Posts: 25% (5 sets x 5%)

Students will complete 5 sets of 2 discussion posts (10 posts total) for specific papers (p. 9-12) and assigned questions (p. 11) prompts throughout the term from Weeks 2-11. The first post must answer the stated weekly discussion question: it must include an individual position and be supported by applicable concepts, theories, and/or evidence related to course content. The second post represents a professional and substantive response to another student's post: it must provide a defense of the ideas presented and evidence for any other ideas refuted or supported. For example, the second post can either support (e.g., provide further evidence from readings or other sources) or critically examine a peer's post (by offering alternative evidence or insights). Both posts must be between 250-500 words total (not including references) and cite all sources in APA (2020) style. Students are also welcome to make additional posts that provide a related topic question that will assist in keeping class discussion going. The assessments are not cumulative, meaning that work not completed by the first assessment date will not be assessed at the second assessment date. All assessments will be done at the end of the second week for the assigned readings and discussion questions (Saturday @ 11:59 pm). The purpose of this assessment tool is: a) to increase engagement and competency with the concepts and theories covered in the readings, b) to facilitate professional interactions with your peers through exchanging ideas and considering divergent viewpoints on the material, c) to demonstrate your skills in extracting and analyzing

scientific information, d) to practice communicating ideas in written form and to facilitate sharing of ideas orally in meeting groups, and e) for students to demonstrate higher order reflective and critical thinking skills such as challenging, refuting and synthesizing ideas. REFER TO APPENDIX B FOR MARKING RUBRIC

Research Presentation: 20%

This project is designed to engage students in critical analysis of the impact of a specific experiment, or related series of experiments, in cognitive-behavioural neuroscience and as it relates to the course readings. There are 40 different assigned articles and times/dates that students may choose from on a first-come-first-serve basis (by email on MyLS only) in the Presentation Schedule (MyLS). The topic of the project will be the following: *"Choose a scientific article – either historical or current – and describe the significance of the science to society, both when it originated and its relevance today. First, describe the key components of the scientific article, specifically highlighting how they relate to concepts covered in the course (e.g., quality of the research question and arguments, including the theory, sources, testing methodology, evidence, and interpretation of the evidence; application of neuroscientific principles; ethical implications; etc…). Second, briefly describe the significance of the theoretical and experimental findings in relation to the literature, course content, and their relevance to society today."*

There are 40 different assigned articles and dates that students may choose from on a first-come-first-serve basis (by email on Course Link only) in the Presentation Schedule (Course Link). The maximum time of the presentation is 15 min – no exceptions – with up to an additional 15 minutes for Q & A & Discussion with the instructor and class. The presentation should answer both questions making sure to provide a summary of the article, discuss the merits and limitations of the research, and its significance to society. Students *must* provide the instructor with any presentation aids (e.g., powerpoint slides, podcast, video, interactive demonstration, etc…) **a minimum of 48 h prior to presentation** and in a format that is compatible with Windows 10. Failure to do so will result in a 10% penalty and risk of 0% for the presentation if there are problems during the presentation session. *There will be no re-scheduling of presentations for any reason.* **The presentation must be based on the instructor approved research article assigned that week.** REFER TO APPENDIX C FOR MARKING RUBRIC.

Research Essay: 20%

Students will independently explore a common theme throughout the course which is the idea that different models of addiction may actually have common mechanisms at their core. **Students must answer the following questions:**

1. *Summarize and appraise the strongest argument for common mechanisms underlying the disease, learning, and neurodevelopmental models of addictive behaviour. Include relevant theory, methodology, and evidence at the three levels of analysis: whole organism, neural circuits, and cellular/molecular processes.*

2. *Summarize and appraise the strongest argument against common mechanisms underlying the disease, learning, and neurodevelopmental models of addictive behaviour. Include relevant theory, methodology, and evidence at the three levels of analysis: whole organism, neural circuits, and cellular/molecular processes.*

3. *Reflect on the societal significance of this debate on the fundamental nature of addictive behaviour and propose a modified and/or novel framework for future research in cognitive-behavioural neuroscience.*

Students will use an evidence-based approach as demonstrated by the instructor throughout the course. First, the essay will begin by introducing the general topic and defining all relevant terms using academic sources. Second, the essay will take a position and present logical arguments supported by empirical and/or theoretical evidence. Third, the essay will identify, discuss, and refute counterarguments in the same manner. Finally, the conclusion of the essay will include a statement of the significance to society of the position of that has been presented both now and for the future. Students are permitted and strongly encouraged to use many of the same research articles discussed throughout the course and/or listed in the reference sections of the assigned textbooks. Students must include a *minimum* of 2 primary, 2 secondary, and 2 tertiary articles. The essay must be between 3-5 pages (1.5 spaced, 12-pt Times Roman Font, 1" margins all around; must be APA (2020) style). REFER TO APPENDIX D FOR MARKING RUBRIC

Course Resources

Required Readings:
Readings and other resources, both required and optional, will be assigned throughout the course. These are listed in the Schedule of Topics (p. 9-13) and full references listed below and are posted on D2L/Course Link. Students may also be required to retrieve information from various websites and the library. D2L/Course Link is password protected and mandatory for meeting course objectives, including assignments and lecture preparation. Students are expected to familiarize themselves with the website and to contact the instructor and classmates between classes, especially in preparation for any collaborative assignments.

Discussion Post Assigned Reading and Questions
Weeks 3-4: Discussion Posts 1 & 2:
Competing Models of Addiction in Human and Animal Research: Disease, Learning, and Self-Medication:
Discussion Posts for Weeks 3-4 based on the following required readings: Leshner (1997), Levy (2013), and McCrory & Mayes (2015). Assigned questions:

> *Is addiction a brain disease? Why or why not? Provide definitions/reasons and evidence/examples to support your position. What evidence would change your mind? Why does this debate matter?*

Weeks 5-6: Discussion Posts 3 & 4:
Challenges to Models of Addiction: Theory, Testing, and Evidence:
Discussion Posts for Weeks 5-6 based on the following required readings: Volkow et al. (2016), Lewis (2017), and Puetz & McCrory (2015). Assigned questions:

> *Are there any conceptual, methodological, and evidentiary errors in these articles? Why or why not? What is the strongest argument presented in each and why?*

Weeks 7-8: Discussion Posts 5 & 6:
Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation

Discussion Posts for Weeks 7-8 based on the following required readings: McEwen et al. (2015), Christakis et al. (2012) and Shadur & Lejuez (2015). Assigned questions:

> *What are the specific mechanisms by which environmental stressors affect neurodevelopment, learning, and behaviour? Provide examples for each of the following levels: whole organism, neural circuits, and cellular/molecular processes.*

Weeks 9-10: Discussion Posts 7 & 8:

Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation

Discussion Posts for Weeks 9-10 based on the following required readings: Lüscher et al. (2020), Manwell & Mallet (2014), and Hyman (2005). Assigned questions:

> *Compare and contrast the mechanisms involved in learning and extinction in the development of drug addiction (e.g., reward and aversion learning and extinction). Are these disease processes as Hyman (2005) proposes? Why or why not?*

Weeks 11-12: Discussion Posts 9 & 10:

Disease, Learning, and Neurodevelopmental Theories of Addiction: Evidence and Interpretation

Discussion Posts for Weeks 8-9 based on the following required readings: Brady & Sinha (2005), Burkett & Young (2012), Firth et al. (2019). Assigned questions:

> *Are there similar or different neurobehavioural mechanisms underlying attachment, addiction, and mental illness? Which model(s) provide the strongest framework for understanding each separately or all together (e.g., disease, learning, or neurodevelopmental)?*

Required Reading Articles:

Belin, D., Belin-Rauscent, A., Everitt, B.J., Dalley, J.W. (2016). In search of predictive endophenotypes in addiction: Insights from preclinical research. *Genes, Brain and Behavior, 15:* 74-88.

Brady, K.T. & Sinha, R. (2005). Co-occurring mental and substance use disorder: The neurobiological effects of chronic stress. *American Journal of Psychiatry, 162*: 1483-1493.

Burkett, J. P., & Young, L.J.(2012). The behavioral, anatomical, and pharmacological parallels between social attachment, love, and addiction. *Psychopharmacology, 224:* 1-26.

Christakis, D.A., Ramirez, J.S.B., & Ramirez, J.M. (2012). Overstimulation of newborn mice leads to behavioral differences and deficits in cognitive performance. *Scientific Reports, 2*: 1-6.

Crone, E.A., Konijin, E.A. (2018). Media use and brain development during adolescence. *Nature Communications, 9 (588):* 1-10

Everitt, B.J. & Robbins, T.W. (2013). From the ventral to the dorsal striatum: Devolving views of their role in drug addiction. *Neuroscience and Biobehavioral Reviews, 37*: 1946-1954.

Fox, S.E., Levitt, P., Nelson, C.A. (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Development, 81:* 28-40.

Feltenstein, M.W., See, R.E., Fuchs, R.A. (2021). Neural substrates and circuits of drug addiction. *Cold Spring Harbor Perspectives in Medicine, 11:* 1-33.

Firth, J., Torous, J., Stubbs, B., Firth, J.A., Steiner, G.Z., Smith, L., Alvarez-Jimenez, M., Gleeson, J., Vancampfort, C.J., Armitage, C.J., & Sarris, J. (2019). The "online brain": How the Internet may be changing our cognition. *World Psychiatry, 18*: 119-129.

Fouyssac, M., Puaud, M., Ducret, E., Marti-Prats, L., Vanhille, N., Ansquer, S., Zhang, X., Belin-Rauscent, A., Giuliano, C., Houeto, J.L., Everitt, B.J., Belin, D. (2021). Environment-dependent behavioral traits and experiential factors shape addiction vulnerability. *European Journal of Neuroscience, 53:* 1794-1808.

Gelfo, F., Mandolesi, F., Serra, L. Sorrentino, G., & Caltagirone, C. (2018). The neuroprotective effects of experience on cognitive functions: Evidence from animal studies on the neurobiological bases of brain reserve. *Neuroscience, 30:* 18-35.

Hall, W., Carter, A., Barnett, A. (2017). Disease or developmental disorder: Competing perspectives on the neuroscience of addiction. *Neuroethics, 10*: 103-110.

Heather, N. (2017). Q: Is addiction a brain disease or a moral failing? A: Neither. *Neuroethics, 10:* 115-124.

Heather, N., Best, D., Kawalek, A., Field, M., Lewis, M., Rotgers, F., Wiers, R.W., Heim, D. (2018). Challenging the brain disease model of addiction: European launch of the addiction theory network. *Addiction Research and Theory, 26:* 249-255.

Heilig, M., MacKillop, J., Martinez, D., Rehm, J., Leggio, L., Vanderschuren, L. (2021). Addiction as a brain disease revised: Why it still matters, and the need for consilience. *Neuropsychopharmacology, 0*: 1-9.

Heinz, A., Daedelow, L.S., Wackerhagen, C., Di Chiara, G. (2018). Addiction theory matters – Why there is not dependence on caffeine or antidepressant medication. *Addiction Biology, 25*: e12735.

Hyman. S.E. (2005). Addiction - A disease of learning and memory. *American Journal of Psychiatry, 162:* 1414–1422.

Kolb, B. & Wishaw, I.Q. (1998). Brain plasticity and behavior. *Annual Review of Psychology, 49:*43-64.

Koob, G.F., Schulkin, J. (2019). Addiction and stress: An allostatic view. *Neuroscience and Biobehavioral Reviews, 106:* 245-262.

Lapiz, M.D.S., Fulford, A., Muchiapura, S., Mason, R., Parker, T., Marsden, C.A. (2003). Influence of postweaning social isolation in the rat on brain development, conditioned behavior, and neurotransmission. *Neuroscience and Behavioural Physiology,* 33: 13-29.

Leshner, A.I. (1997). Addiction is a brain disease, and it matters. Frontiers in Neuroscience: The Science of Substance Abuse. *Science, 278*: 45-47.

Levy, N. (2013). Addiction is not a brain disease (and it matters). Hypothesis and Theory Article. *Frontiers in Psychiatry, 4:* 1-7.

Lewis, M. (2015). *The Biology of Desire: Why Addiction is Not a Disease*. Anchor Canada Division of Penguin Random House Company: Canada. (*Ch. 1 and 8 only in pdf.)*

Lewis, M. (2017). Addiction and the brain: Development, not disease*. Neuroethics*, *10:* 7-18.

Leyton, M., Vezina, P. (2014). Dopamine ups and downs in vulnerability to addictions: A neurodevelopmental model. Cell Press. *Trends in Pharmacological Sciences, 4*: 1-9.

Lüscher, C., Robbins, T.W., Everitt, B.J. (2020). The transition to compulsion in addiction. *Nature Neuroscience, 21:* 247-263.

Manwell, L.A. & Mallet, P.E. (2014). Comparative effects of pulmonary and parenteral delta-9-tetrahydrocannabinol exposure on extinction of opiate-induced conditioned aversion in rats. *Psychopharmacology, 232:* 1655-1665.

Manwell, L.A., Tadros, M., Ciccarelli, T., Eikelboom, R.E. (2021). Digital dementia in the internet generation: Excessive screen time during brain development will increase risk of Alzheimer's disease and related dementias in adulthood. *Journal of Integrative Neuroscience, in press.*

McCrory, E.J. & Mayes, L. (2015). Understanding addiction as a developmental disorder: An argument for a developmentally informed multilevel approach. *Current Addiction Reports, 2*: 326-330.

McEwen, B.S., Bowles, N.P., Gray, J.D., Hill, M.H., Hunter, R.G., Karatsoreos, I.N., & Nasca, C. (2015). Mechanisms of stress in the brain. *Nature Neuroscience, 18*: 1353-1363.

Menne, V. & Chesworth, R. (2020). Schizophrenia and drug addiction comorbidity: Recent advances in our understanding of behavioural susceptibility and neural mechanisms. *Neuroanatomy and Behaviour, 2020,* 2: e10. doi: 10.35430/nab.2020.e10

Murray, J.E., Bevins, R.A. (2010). Cannabinoid conditioned reward and aversion: Behavioral and neural processes. *American Chemical Society Chemical Neuroscience, 1*: 265-278

Neophytou, E., Manwell, L.A., & Eikelboom, R. (2019). Effects of excessive screen time on neurodevelopment, learning, memory, mental health, and neurodegeneration: A scoping review. *International Journal of Mental Health and Addiction*, doi: 10.1007/s11469-019-00182-2.

Ouzir, M., Errami, M. (2016). Etiological theories of addiction: A comprehensive update on neurobiological, genetic and behavioural vulnerability. *Pharmacology, Biochemistry, and Behavior, 148*: 59-68.

Perry, B.D. & Pollard, R. (1998). Homeostasis, stress, trauma, and adaptation: A neurodevelopmental view of childhood trauma. *Child and Adolescent Psychiatric Clinics of North America, 7:* 33-51.

Peutz, V., McCrory, E. (2015). Exploring the relationship between childhood maltreatment and addiction: A review of the neurocognitive evidence. *Current Addiction Reports, 2*: 318-325.

Popescu, A., Marian, M., Dragoi, A.M., Costea, R.V. (2021). Understanding genetics and neurobiological pathways behind addiction. *Experimental and Therapeutic Medicine, 21:* 544-554.

Satel, S. & Lillenfeld., S.O. (2013). Addiction and the brain disease fallacy. *Frontiers in Psychiatry, 4:* 1-11.

Shadur, J.M., Lejuez, C.W. (2015). Adolescent substance use and comorbid psychopathology: Emotion regulation deficits as a transdiagnostic factor. *Current Addiction Reports, 2:* 354-363.

Snoek, A. & Matthews, S. (2017). Introduction: Testing and refining Marc Lewis's critique of the brain disease model of addiction. *Neuroethics, 10*: 1-6.

Spanagel, R. (2017). Animal models of addiction. *Dialogues in Clinical Neuroscience, 3:* 247-258.

Volkow, N.D, Koob, G.F., & McLellan, A.T. (2016). Neurobiologic advances from the brain disease model of addiction. *New England Journal of Medicine, 374*:363-71.

Wiers, R.W., Verschure, P. (2021). Curing the broken brain model of addiction: Neurorehabilitation from a systems perspective. *Addictive Behaviors, 112*: 1-19.

Optional/Additional Readings:

American Psychological Association (2020). *Publication manual of the American Psychological Association* (7th ed.). https://org/doi/10.1037/0000165-000

Bilimoria, P.M., Hensch, T.K., Bavelier, D. (2012). A mouse model for too much TV viewing? *Trends in Cognitive Neuroscience, 16:* 529-531

Bouton, M. (2002). Context, ambiguity, and unlearning: Sources of relapse after behavioural extinction. *Biological Psychiatry, 52:* 976-986.

Boyd (2000). Disease, illness, sickness, health, healing and wholeness: exploring some elusive concepts. *Journal of Medical Ethics: Medical Humanities, 26*: 9-17.

Cascio, C.J., Moore, D., McGlone, F. (2019). Social touch and human development. *Developmental Cognitive Neuroscience, 35:* 5-11.

Christakis, D.A. (2009). The effects of infant media usage: What do we know and what should we learn? *Acta Pediatrica, 98*: 8-16.

Christakis, D.A., Ramirez, J.S.B., Ferguson, S.M., Ravinder, S., Ramirez, J.-R. (2018). How early media exposure may affect cognitive function: A review of results from observations in humans and experiments in mice. *Proceedings of the National Academy of Sciences*, 115: 9851-9858.

Christakis, D.A., Zimmerman, F.J., DiGiuseppe, D.L., & McCarty, C.A. (2004). Early television exposure and subsequent attentional problems in children. *Pediatrics, 113*: 708-713.

Deleuze, J., Rochat, L., Romo, L., Van der Linden, M., Achab, S., Thorens, G., Khazaal, Y., Zullino, D., Maurage, P., Rothen, S., Billieux, J. (2015). Prevalence and characteristics of addictive behaviours in a community sample: A latent class analysis. *Addictive Behaviors Reports, 1*: 49-56.

Giovacchini, G., Giovanni, E., Borso, E., Lazzeri, P., Riondato, M., Leoncini, R., Duce, V., Mansi, L., Ciarmiello, A. (2018). The brain cognitive reserve hypothesis: A review with emphasis on the contribution of nuclear medicine neuroimaging techniques. *Journal of Cellular Physiology, 234*: 14865-14872.

Grifell & Hart (2018). Is drug addiction a brain disease? *American Scientist, 106*: 160.

Heather, N. (2018). Rethinking addiction. *The Psychologist, 31*: 24-29

Lüscher, C., Janak, P.H. (2021) Consolidating the circuit model for addiction. *Annual Review of Neuroscience, 44:* 173-95.

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Course Policies

Grading Policies

Undergraduate Grading Procedures
Graduate Grade interpretation
Please note that these policies are binding unless academic consideration is given to an individual student.

Missed Classes/Assignments and Late Policy

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment). However, requests for Academic Consideration may still require medical documentation as appropriate. For example, a missed class and/or assignment without appropriate documentation will result in a mark of "zero" – without exception. Documentation must be submitted within 24 hours after the missed class or assignment and will be taken into consideration on a case-by-case basis. Appropriate accommodations will be made at the Instructor's discretion and may include a deferred submission date and/or alternative assignment of a similar nature. Travel plans are not a valid reason to miss a class or assignment and will result in a mark of "zero". The penalty for late assignments handed in on the same day but AFTER the designated time period (i.e. during class) is 2%. After that, a 5% penalty is applied each day (including Saturday and Sunday) up to a maximum of 5 days after which a mark of zero will be applied.

University Information on Safety Protocols:

For information on current safety protocols, follow these links: https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces
Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives

Intellectual Property Rights of Instructor and Remote Learning Specific Information:

The educational materials developed for this course, including, but not limited to, lecture notes and slides, handout materials, examinations and assignments, and any materials posted to D2L, are the intellectual property of the course instructor. These materials have been developed for student use only and they are not intended for wider dissemination and/or communication outside of a given course. Posting or providing unauthorized audio, video, or textual material of lecture content to third-party websites violates an instructor's intellectual property rights, and the Canadian Copyright Act. Recording lectures in any way is prohibited in this course unless specific permission has been granted by the instructor. Failure to follow these instructions may be in contravention of the university's Student Non-Academic Code of Conduct and/or Code of Academic Conduct, and will result in appropriate penalties. **Participation in this course**

constitutes an agreement by all parties to abide by the relevant University Policies, and to respect the intellectual property of others during and after their association with the University of Guelph.

Guidelines for Technology use During Class and During Course:

Instructors are permitted to regulate use of technology for social communicative purposes. Students who require technology as an assistive device for learning are encouraged to register with Accessible Learning. **Obligations of Instructor.** Instructors are required to make explicit on course syllabi Guidelines for Technology use During Class and During Course Assessments and make explicit any consequences for inappropriate use of technology. *The use of audio/or video recording devices during lecture is strictly prohibited*. Please turn off all electronic devices at the start of class. Failure to do so can result in being asked to leave the classroom. Students are permitted to use laptops strictly for the purpose of note-taking. Use of laptops for reasons other than note-taking is strictly forbidden. Any behaviour that is disruptive to student learning in the classroom, including off-task use of technology, will not be tolerated and students will be asked to leave. Students who are asked to leave will be responsible for all material covered during their absence. **Use of visual or audio images.** Image, video, and audio recording of instructors or in -class activities are strictly prohibited without the prior written consent of the instructor, students, and/or Accessible Learning. **Use of technology during assessments.** Students may be permitted to use technological devices during assessments only under the direct and written permission, in advance of the exam or test date, of the course instructor or Accessible Learning. **Obligations of Students.** Students are encouraged to make informed decisions regarding technology use during class and assessment. Some devices are distracting during learning and can disrupt the learning of others. Off -task use of technology (e.g., communicating with friends/family; using social networking sites; playing games; accessing the internet on websites not related to the course; reading an electronic book that is not related to the course; playing music or video, etc.) during instruction which are distracting to self or others are prohibited. **Copyright.** The educational materials developed for this course, including, but not limited to, lecture notes and slides, handout materials, examinations and assignments, and any materials posted to Course Link, are the intellectual property of the course instructor. These materials have been developed for student use only and they are not intended for wider dissemination and/or communication outside of a given course. Posting or providing unauthorized audio, video, or textual material of lecture content to third-party websites violates an instructor's intellectual property rights, and the Canadian Copyright Act. Recording lectures in any way is prohibited in this course unless specific permission has been granted by the instructor. Failure to follow these instructions may be in contravention of the university's Code of Student Conduct and/or Code of Academic Conduct, and will result in appropriate penalties. **Participation in this course constitutes an agreement by all parties to abide by the relevant University Policies, and to respect the intellectual property of others during and after their association with the University of Guelph.**

Course Policy on Group Work:
Everyone has the right to learn, the responsibility not to deprive others of this right, and is accountable for one's actions. Please let the instructor know immediately if you have a problem that is preventing you from performing satisfactorily in this class. Each student and his/her success in this course is very important to me; please help me help you achieve your professional and personal goals for this course. Please consider the following for student success in the course:

- Attend all scheduled classes and arrive on time prepared with lecture notes.
- Electronic devices are restricted to class-related activities only and recordings are not permitted.
- Disruptive behaviour is not tolerated and students will be required to leave.

Course Policy Regarding Use of Electronic Devices and Recording of Lectures:
Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

University Policies

Academic Consideration
When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration:
Academic Consideration, Appeals and Petitions

Academic Misconduct
The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
Academic Misconduct Policy

Accessibility
The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 54335 or email accessibility@uoguelph.ca or the Student Accessibility Services Website

Course Evaluation Information
Please refer to the Course and Instructor Evaluation Website **.**

Drop date
The last date to drop one-semester courses, without academic penalty, is Dec. 4, 2020. For regulations and procedures for Dropping Courses, see the Schedule of Dates in the Academic Calendar.
Current Undergraduate Calendar

University Policy Regarding Recording of Lecture Materials
The University of Guelph's primary mode of course delivery has shifted from face-to-face instruction to remote and online learning due to the ongoing COVID-19 pandemic. As a result, some learning activities (e.g., synchronous lectures or student presentations) may be recorded by faculty, instructors and TAs and posted to CourseLink for grading and dissemination; students may be recorded during these sessions. By enrolling in a course, unless explicitly stated and brought forward to their instructor, it is assumed that students agree to the possibility of being recorded during lecture, seminar or other "live" course activities, whether delivery is in-class or online/remote. If a student prefers not to be distinguishable during a recording, they may:

1. turn off their camera
2. mute their microphone
3. edit their name (e.g., initials only) upon entry to each session
4. use the chat function to pose questions.

Students who express to their instructor that they, or a reference to their name or person, do not wish to be recorded may discuss possible alternatives or accommodations with their instructor.

Additional Course Information

Courselink and Turnitin*:*
Course instructors are allowed to use software to help in detecting plagiarism or unauthorized copying of student assignments. Plagiarism is one of the most common types of academic misconduct on our campus. Plagiarism involves students using the work, ideas and/or the exact wording of other people or sources without giving proper credit to others for the work, ideas and/or words in their papers. Students can unintentionally commit misconduct because they do not know how to reference outside sources properly or because they don't check their work carefully enough before handing it in. Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of

assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. In this course, your instructor will be using Turnitin.com to detect possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to prevent plagiarism in the College of Social and Applied Human Sciences. A major benefit of using Turnitin is that students will be able to educate and empower themselves in preventing misconduct. In this course, you may screen your own assignments through Turnitin as many times as you wish before the due date. You will be able to see and print reports that show you exactly where you have properly and improperly referenced the outside sources and materials in your assignment.

Description of Grades: By now, you are probably familiar with the University's grading scheme:

A+	90-100%	C	63-66
A	85-89	C-	60-62
A-	80-84	D	57-59
B+	77-79	D-	50-52
B	73-76	F	0-49
B-	70-72		

80-100 (A) Excellent An outstanding performance in which the student demonstrates superior grasp of the subject matter and an ability to go beyond the given material in a critical and constructive manner. The student demonstrates a high degree of creativity and/or logical thinking, a superior ability to organize, to analyse and to integrate ideas, and a thorough familiarity with the relevant literature and techniques.

70-79 (B) Good A more than adequate performance in which the student demonstrates a thorough grasp of the subject matter, and an ability to organize and examine the material in a critical and constructive manner. The student demonstrates a good understanding of the relevant issues and a familiarity with the relevant literature and techniques.

60-69 (C) Satisfactory An adequate performance in which the student demonstrates a generally adequate grasp of the subject matter and a moderate ability to examine the material in a critical and constructive manner. The student displays an adequate understanding of the relevant issues, and a general familiarity with the relevant literature and techniques.

50-59 (D) Poor A barely adequate performance in which the student demonstrates a familiarity with the subject matter, but whose attempts to examine the material in a critical and constructive manner are only partially successful. The student displays some understanding of the relevant issues, and some familiarity with the relevant literature and techniques.

0-49 (F) Fail An inadequate performance.

Standard Statements - UNDERGRADUATE (AVPA office)

E-mail Communication
As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement
When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration.

Drop Date
Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

Copies of out-of-class assignments
Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility
The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student. When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway. Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 7 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. More information: www.uoguelph.ca/sas

Academic Misconduct
The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission

of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

APPENDIX A

Participation and Professionalism: 30%
(*All required classes; Assessments of 15% on Weeks 6 and 13)*

Attendance, Participation, and Professionalism: /10

0-2: Does not meet minimum criteria for acceptable work; did not demonstrate critical thinking skills, organization, interpretation of resources, or logical flow of ideas; unclear or incomplete arguments; missed many classes and/or did not make up any missed work; did not contribute constructively to classes; lack of respect for instructor and/or peers; distracted and/or disruptive in class; not on task during class discussions and team work.

3-4: Minimally acceptable. Demonstrates limited preparation for classes; demonstrates limited critical thinking skills, organization, interpretation of resources, and logical flow of ideas; unclear or incomplete arguments; missed some classes and/or did not make-up class work; minimal constructive contribution to class discussions and team work; often not on task during class discussions and team work.

5-6: Acceptable. Demonstrates adequate preparation for classes; demonstrates adequate critical thinking skills organization, interpretation of resources, and logical flow of ideas; clear and complete arguments; demonstrates some principles learned throughout the course; incomplete critique of ideas; on task during class discussions and team work; interacts with instructor and peers in a respectful manner; listens/responds to ideas and offers own ideas; almost no missed classes; made up all missed class work.

7-8: Well done. More than adequate preparation and participation; demonstrates more than adequate critical thinking skills, organization, interpretation of resources, and logical flow of ideas; clear and complete arguments; uses correct and relevant evidence to support or refute points; demonstrates many principles learned throughout the course; strong critique of ideas; always on task during class discussions and team work; demonstrates consistent and positive interactions with instructor and peers; openly shares insights and encourages others to reciprocate; no missed classes and/or or made up all class work.

9-10: Outstanding performance. Student demonstrates superior preparation and participation; demonstrates superior critical thinking skills in discussion of complex topics; excellent use and interpretation of resources and logical flow of ideas; clear, concise, complete and novel arguments presented with corresponding evidence in supporting or refuting points; strong and interesting critique of ideas; always on task during class discussions and team work; demonstrates consistent and positive interactions with instructor and peers; consistently engages with others by respectfully offering and critiquing ideas; no missed classes or missed class work.

Comments:

APPENDIX B

Discussion Forum Posts: 5 x 5 = 25% (*Assessments of on Weeks 4, 6, 8, 10 & 12)*

Content and Comprehension: /25

0 - 10: Does not meet the minimum criteria for acceptable work. Incomplete, incoherent or incorrect. Sources and APA format missing.

11-14: Minimally acceptable. Demonstrates limited writing skills, organization, and interpretation of text; did not answer all of the questions or did not provide meaningful answers; many grammatical and spelling errors. Sources and APA format incomplete or incorrect.

15-19: Acceptable. Demonstrates adequate writing skills, organization and interpretation of text; demonstrates that the student has read and understood the basic ideas in the assigned readings; answered all questions but one or more answers were cursory or too general; some grammatical and spelling errors. Sources and APA format complete and correct.

20-22: Well done. More than adequate writing skills, organization and interpretation of text; demonstrates that the student has read and understands the major ideas in the assigned readings; summaries are concise and coherent; answered all questions, reflecting a good grasp of the important issues; few grammatical and spelling errors. Sources and APA format complete and correct.

23-25: Excellent. Outstanding performance in which the student demonstrates superior writing skills, organization, and interpretation of text; student fully answered assigned questions with a high degree of insight and/or provided additional information making connections beyond what was required; no or almost no grammatical or spelling errors. Sources and APA format complete and correct.

Comments:

APPENDIX C

RESEARCH PRESENTATION: 20%

Content and Comprehension: /10

0-2: Does not meet the minimum criteria for acceptable work. Does not demonstrate critical thinking skills, organization, interpretation of primary and/or secondary sources, and/or logical flow of ideas; no evidence-based arguments presented.

3-4: Minimally acceptable. Demonstrates limited critical thinking skills, organization, interpretation of primary and/or secondary sources, and logical flow of ideas; unclear or incomplete evidence-based arguments presented.

5-6: Acceptable. Adequate critical thinking skills, organization, interpretation of primary and/or secondary sources, and logical flow of ideas; demonstrates some basic principles learned throughout the course; some basic evidence-based arguments presented.

7-8: Well done. More than adequate critical thinking skills, organization, interpretation of primary and/or secondary sources, and logical flow of ideas; demonstrates application of content and critical thinking principles to work; correct description of experimental findings and their significance; uses evidence to support ideas as taught during lectures and according to assigned readings and APA (2020); reason for topic choice is clear and relevant; advanced evidence-based arguments presented.

9-10: Outstanding performance. Demonstrates superior critical thinking skills, organization, interpretation of primary and/or secondary sources, and logical flow of ideas; accurate and thorough description of the experimental findings and their significance; uses evidence to support arguments as taught during lectures and according to assigned readings and APA (2020); engages the audience with insight, critical arguments, and novel and/or unique perspective; the importance and relevance of the topic are clear and compelling; topic is meaningful and challenging; exceptional evidence-based arguments presented.

Approach to Project Topic: /10

0-2: Does not meet the minimum criteria for acceptable work. Presentation is unacceptable.

3-4: Minimally acceptable. Demonstrates limited understanding of principles of cognitive-behavioural neuroscience; choice of topic and arguments are too simplistic or obvious; unprepared to present; unable to answer questions.

5-6: Acceptable. Demonstrates adequate understanding of principles of cognitive-behavioural neuroscience; topic and presentation format are complimentary; choice of topic and arguments are somewhat cursory but provides some opportunity for discussion and debate; prepared to present; minimal answers to questions.

7-8: Well done. More than adequate understanding of principles of cognitive-behavioural neuroscience; topic and presentation format complement each other; choice of topic and arguments are meaningful and relevant; well prepared to present; well informed answers to questions.

9-10: Outstanding performance. Demonstrates superior understanding of the principles of cognitive-behavioural neuroscience; topic and presentation format enhance each other; choice of topic and arguments are very significant and compel the audience to re-evaluate their prior knowledge of the topic; more than well prepared to present; well informed and insightful answers to questions; thoroughly engages audience in topic and various perspectives; takes a risk focusing on controversial and/or less well known information/positions; highly constructive and very professional.

Comments:

APPENDIX D

RESEARCH ESSAY: 25%

Content and Comprehension: /10

0-2: Does not meet the minimum criteria for acceptable work. Does not demonstrate critical thinking skills, organization, interpretation of primary and/or secondary sources, and/or logical flow of ideas; no evidence-based arguments presented. Essay is unacceptable.

3-4: Minimally acceptable. Demonstrates limited writing skills, organization, interpretation of primary and secondary sources, and logical flow of ideas; some grammatical and/or spelling errors; follows some APA (2020) guidelines.

5-6: Acceptable. Adequate writing skills, organization, interpretation of primary and secondary sources, and logical flow of ideas; demonstrates that student has read the assigned readings and other academic sources and applied the content and critical thinking principles to his/her work; few grammatical and/or spelling errors; follows most APA (2020) guidelines.

7-8: Well done. More than adequate writing skills, organization, interpretation of primary and secondary sources, and logical flow of ideas; demonstrates the student has read the assigned readings and applied the content and critical thinking principles to his/her work; student uses evidence to support arguments as taught during lectures and according to assigned readings and/or other relevant and academic sources; no or almost no grammatical and/or spelling errors; follows all APA (2020) guidelines.

9-10: Outstanding performance. Student demonstrates superior writing skills, organization, interpretation of primary and secondary sources, and logical flow of ideas; student uses evidence to support arguments as taught during lecture and according to assigned readings and/or other relevant and academic sources; student engages the reader with insight, critical arguments, and novel and/or unique perspective; no grammatical or spelling errors; follows all APA (2020) guidelines.

Approach to Questions: /10

0-2: Does not meet the minimum criteria for acceptable work. Does not demonstrate reflective and/or critical thinking skills; did not answer assigned essay questions. Essay is unacceptable.

3-4: Minimally acceptable. Demonstrates limited reflective and/or critical thinking skills; did not answer the assigned essay questions.

5-6: Acceptable. Demonstrates adequate reflective and/or critical thinking skills; answered some of the essay questions or partially answered questions; incomplete evidence and arguments presented.

7-8: Well done. More than adequate reflective and/or critical thinking skills; partially answered all of the essay questions; supportive evidence and clear arguments presented.

9-10: Outstanding performance. Student demonstrates superior reflective and/or critical thinking skills;
thoroughly answered all of the essay questions; strong evidence and balanced arguments presented; student engages reader topic and various perspectives; student takes a risk focusing on controversial and/or less well known information/positions.

References/Sources: /5

0-1: Does not meet the minimum criteria for acceptable work. Sources are incomplete.

1.5-2: Minimally acceptable. Primary/secondary/tertiary sources are missing, incomplete, or inadequate.

2.5-3: Acceptable. Primary/secondary/tertiary sources are complete, adequate at minimum requirements.

3.5-4: Well done. Primary/secondary/tertiary sources extend beyond the minimum requirements and are highly relevant, novel, and interesting, providing a unique perspective

4.5-5: Outstanding performance. Primary/secondary/tertiary sources extend beyond the minimum
requirements and are highly relevant, novel, challenging, thought-provoking, and compel the reader to re-evaluate his/her understanding of the issues discussed.

Comments: