

PSY 411W- Biopsychology of Behavioral Development

Spring, 2021

Description: The objective of this advanced seminar course is to examine the biological factors influencing how behavior is shaped by events that occur during early life, as well as how behavior changes over the course of organisms' early development. These changes result from a complex interaction among an organism's genetic profile, physical development (especially of the nervous system), sensory experience, exposure to internal and external chemical factors, and their social environment. Over the course of the semester, we will explore each of these factors and more. Much of what's known about this topic is from research on non-human animals, but relevant information about human development will be included whenever possible. Please be aware that this course deals with **a lot of biology** underlying the development of behavior. If you don't think that you like biology very much, this may not be the course for you. Students should already have completed Brain and Behavior (PSY 209) or another course in neuroscience (IBIO 300, 405; NEU 300, 301, 302), as well as their Tier I writing requirement, before taking this course.

Where and When: Via Zoom; Tuesdays and Thursdays, 1:00-2:20 pm.

Instructor: Prof. J. Lonstein

Office - 219 Giltner Hall

Phone - 353-8675

E-mail - lonstein@msu.edu

Office Hours - Thursdays 11:30-12:30 pm by Zoom, or by appointment

Textbook: None, just assigned readings each week

Grading:

1. Of the 200 points to obtain toward your grade this semester, 15% of your grade will be based on you reading and commenting/reflecting on the reading assignments (15 points) and frequency of participation in class discussions through the semester (15 points).

The course will run like this: For each topic in the course I will present background material for two class periods. For all topics you will have some scientific articles assigned as the readings, but for six of the topics (see which six below) your readings will be discussed in detail during the class period after I lecture on the topic. All articles are uploaded into D2L so you can easily access them. You must read all the articles assigned, but to particularly ensure you read the ones for each of the six class discussion days, before you arrive to class on those days you will write a relatively short commentary/reflection about each of three articles assigned for commentary/reflection (that is, you will prepare three commentaries/reflections each time, with one commentary/reflection for each article assigned to be commented on) and submit them on D2L by the beginning of class that discussion day. Each one of the three commentaries/reflections due for a discussion day should be about 1/3-page of single-spaced text, use 12-pt Times New Roman font, one-inch margins, and must directly pertain to the topic and content of the article. They should be about something in each article you thought was particularly interesting, some specific aspects of each article you would have liked the authors to have explained better (and state why), and/or how something about the article connected with something specific you've learned in another course. This portion of your grade will be based on you handing these in, as well as whether the commentaries/reflections show that you read and thought about the articles before attending class. I will grade these each of the six times using a 2.5-point system: 0 = you didn't hand anything in, 1.5 = unsatisfactory (your comments were superficial, I can't tell if you read anything other than the abstract, it was quickly done just before class), or 2.5 = satisfactory (you clearly spent some time reading and thinking about the articles). You can hand in a set of commentaries/reflections late only if you have a documented medical, religious, or legal excuse and in those cases it must be handed in within one week of when the original due date.

Everyone must read the articles before coming to the class discussion days because on those days I

will split the students into small groups on Zoom to talk about each article. For 10-15 minutes, each group will discuss four things about one of the assigned articles: (1) what the experiments intended to investigate and what the authors' hypotheses were, (2) how the experiments were performed, (3) what the major findings were, and (4) what the authors' major conclusions were. If you still have time after covering these four details about the article, you can also share with your group what you wrote in your commentaries/reflections. I will then randomly choose one member of each group to take ~10 minutes to verbally present the highlights of that article to the rest of the class. The whole class will then discuss the article. You will not know before class which article your group will discuss or present. All students will present over the course of the semester. If you contribute even one time to the larger group discussion about the articles, you will receive the two discussion points available for that discussion day (6 discussion days x 2.5 points each = 15 points). Becoming comfortable discussing the scientific material you read for class is a critical objective of this course. Therefore, **even if you regularly attend class, if you never participate in class discussions you will receive a zero for this portion of your grade.**

2) 35% of your course grade will come from the midterm exam (70 points). You will take the exam while attending class on Zoom and it will be closed-book and in all essay format. It will cover material presented through the class period before the exam. The exam will cover material from both the lectures and the assigned readings. Some information you are responsible for may only be discussed in class, and will not be found in the textbook or the readings, so you will have to attend class to get all of the information. I may give you a pool of essays that could be used on the exam to help you study, but you do not have permission to work together to create responses to them before the exam (that is, your studying and draft answers must be generated independently). The course may use the free software *Respondus Lockdown Browser*TM and *Respondus Monitor*TM to proctor the exam; if so, I will discuss how you can download and use this free software at least a week before the exam. After the exam is graded and handed back, any questions about how your exam was graded must be sent to me by email within one week after I return your exam, after which you and I will meet via Zoom within a week to discuss it. I will not reconsider exam grades any later in the semester than that. A make-up exam will be granted only the case of a documented medical, religious, or legal excuse and must be completed within 7 days of the original exam date. It may or may not be the same exam that was taken by the other students in the class.

3) 10% of your grade (20 points) will be based on an end-of-semester quiz. This quiz will not be cumulative, but instead based on the lecture material and readings only since the midterm exam. This quiz will be closed-book and not essays, but instead will consist of multiple choice questions. This quiz is relatively low-stakes (low points) because I know you'll have work to do near the end of the semester to complete your final paper (see #4 below). It will help to reward students who attend lectures after the midterm until the end of the semester. You may again be required to use the free software *Respondus Lockdown Browser*TM and *Respondus Monitor*TM to proctor this quiz.

4) The last 40% of your grade (80 points) will be from preparing and handing in a final term paper. Your paper will be an in-depth review of the scientific research done on the biological factors involved in a small subfield of your choice that is highly related one of the topics covered in class. The paper must review a topic related to early-life development, a behavior or mental process (e.g., emotion, cognition), and the relevant underlying biology (preferably involving the brain). This term paper will be no fewer than 8 full, double-spaced typed pages of meaningful text. These 8 pages do not include the title page or references. If your final term paper has fewer than 8 pages of meaningful and relevant text, each page short will involve a 10% loss of your term paper grade. You must use 12-point Times Roman font and 1-inch margins around. Do not include a running header at the top of the pages or use subheadings within the text. Do not include any additional spaces between paragraphs. Please do include page numbers on the bottom of each page. A list of references used in the paper must be included at the end of the main text of the paper and follow the American Psychological Association (APA) formatting style for references. Footnotes are not acceptable. The paper cannot use more than ½ page as a general introduction to your topic and cannot use more than ½ page for summary or conclusions at the end.

To obtain the necessary information for your term paper you should exclusively use primary scientific articles similar to the ones we read in class. Textbooks, articles from popular magazines, health-related websites, and class lecture notes are not appropriate sources for this paper and I will ask you to remove them. The three essential places to find abstracts of the articles you should use for your paper are: <https://pubmed.ncbi.nlm.nih.gov/>, Google Scholar, and the PsychInfo database accessible on the MSU Library webpage. When on these websites, type in the keywords most relevant for your paper topic. Once you find the abstracts of the article you're interested in, you can either download the full articles from the links provided on the database webpages, or if those links are not available you can make a request through the Main Library webpage to send you a PDF of the article through Interlibrary Loan. Again, sources other than these databases or the MSU Library probably aren't appropriate for this paper.

To receive full credit for the term paper, you must turn in on the assigned dates specified below: (1) A 1-page double-spaced description of the topic you would like to write about and a brief discussion of why you think it's an important/interesting topic. I'll then email with you to discuss and help you refine the topic. (2) A detailed outline of your paper. This outline must include the major topics you expect to have in your paper, some detailed subheadings placed under those major topics, and references placed at appropriate places within the outline to at least 10 scientific articles you found on Medline, PsychInfo or elsewhere from the MSU library that could be used as a start to the factual support for your subtopics. The number of sources of factual support necessary for your completed 8-page term paper is difficult to estimate (depends on the topic), but in the past most term papers for this course have needed at least 20 cited sources. I'll look at your outlines and then email or make an appointment with you to discuss your outline and may ask you to revise it. (3) MS Word file containing your final paper submitted on D2L. Throughout the semester, we'll take considerable class time to talk about the content and structure of the term paper, and tips to think about when writing a review of a small scientific literature. I'll also be happy to read one partial draft of your paper, to let you know if you're on the right track, as long as I receive them at least four days before the final version of the paper is due. Do not wait until the last week of school or finals week to complete this paper. If you do, you will not have enough time to do a good job on this assignment. This paper should take at least 3 weeks to put together appropriately. **You cannot pass the course without satisfactorily completing all components of this term paper (one-page summary, outline and meeting/emailing with me, full final paper)**, even if you could have enough points to pass the course without handing in parts of this assignment. You are also required to submit the final draft of your paper to analysis by Turn-It-In on our D2L site under the "Assignments" tab to verify that the content is original (see below for details).

Grading Summary and Scale:

- Commentaries/Reflections = 15 points (2.5 points each)
- Class Discussion = 15 points (2.5 points for each discussion day you contribute)
- Midterm Exam = 70 points
- End of Semester Quiz = 20 points
- Final Term Paper = 80 points (summary = 5 pts, outline = 15 pts, paper = 60 pts)

TOTAL = 200 points

>180 points = 4.0; 170-179 points = 3.5; 160-169 points = 3.0; 150-159 points = 2.5; 140-149 points = 2.0; 130-139 points = 1.5; 120-129 points = 1.0; <120 points = 0.0

Academic Honesty and Integrity:

MSU has strict guidelines regarding academic honesty and integrity. These rules will be followed in this class and no student is exempt for any reason. Refer to your Student Handbook to see details of these guidelines. Academic Honesty Article 2.3.3 of the Academic Freedom Report states, "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the Psychology Department adheres to the policies on academic honesty specified in General Student Regulation 1.0 - Protection of Scholarship and Grades (<http://splife.studentlife.msu.edu/regulations/general-student-regulations>), the University Policy on Integrity of Scholarship & Grades (<http://splife.studentlife.msu.edu/regulations/student-group-regulations-administrative-rulings-all-university-policies-and-selected-ordinances/integrity-of-scholarship-and-grades>), and Ordinance 17.00 - Examinations (<https://www.msu.edu/~ombud/academic-integrity/index.html#ordinance>). Therefore, unless authorized by me, you are expected to complete all course assignments without assistance from each other or any other source. You are not authorized to use the www.Koofers.com or similar web sites to complete any work in this course. Students who violate MSU rules may receive a penalty grade, including but not limited to a failing grade on the assignment or for the entire course. If you have any questions or concerns about whether any particular activity is permitted in carrying out the work for this course are urged to see the very useful web site prepared by the University Ombudsperson at www.msu.edu/unit/ombud, especially the section on Academic Honesty. The Ombudsperson has some very specific information about the kinds of activities that are or are not appropriate. Also, please do not hesitate to discuss concerns or questions about these issues with me.

Furthermore, consistent with MSU's efforts to enhance student learning, foster honesty, and maintain integrity in our academic processes, Professor Lonstein will use a tool called TurnItIn to compare a student's work with multiple sources. The tool compares each student's work with an extensive database of prior publications and papers, providing links to possible matches and a 'similarity score'. The tool does not determine whether plagiarism has occurred or not. Instead, Professor Lonstein must make a complete assessment and judge the originality of the student's work. All submissions to this course might be checked using this tool. Your terms papers will be checked. Students should submit their draft and final term papers to the TurnItIn Dropbox on D2L without identifying information included in the paper (e.g. name or student number), because although the system will automatically show this information to Professor Lonstein when viewing the submission, the information will not be retained by Turnitin. Student submissions will be retained in the global TurnItIn repository.

Limits to Confidentiality:

Please be aware that class materials are generally considered confidential pursuant to the University's student record policies. However, all University employees, including instructors, cannot maintain confidentiality when it conflicts with their responsibility to report certain issues based on external legal obligations or health and safety considerations of MSU community members and others. As the instructor, Professor Lonstein must report the following information to other University offices if you share it with him:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child
- Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff
- Credible threats of harm to oneself or to others

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual or not. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the MSU Counseling Center (<http://www.counseling.msu.edu/students>).

Accommodations for Students with Disabilities:

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to Professor Lonstein at the start of the term and/or **two weeks prior to the accommodation date** (exam, other assignments). Requests received after this date may not be honored. If you require testing accommodations (additional time, less disruptive room, etc.) you must contact Professor Lonstein and present your VISA **at least two weeks before the exam date** to schedule an alternative exam. Typically, he will schedule for you to take the exam during a special exam session arranged by him or offered by the Psychology Department every Wednesday at 3:00 pm and Friday at 9:00 am in Giltner Hall room 346. If you are unable to make any of those times, or the options do not meet your VISA accommodations, you may be able to schedule to take your exam at the RCPD office. In any case, the exam must be scheduled well in advance, so you need to adhere to the two week prior notification requirement.

<u>Date</u>	<u>Topic</u>
Tu Jan. 12	Introduction to Developmental Psychobiology
Th/Tu Jan. 14, 19	Evolution & Development, Nature & Nurture <ul style="list-style-type: none"> • Gould SJ (1991). Exaptation: A crucial tool for an evolutionary psychology. <i>J Social Issues</i> 47: 43-65 • McCall RB (1981). Nature-nurture and the two realms of development: A proposed integration with respect to mental development. <i>Child Dev</i> 52:1-12. • Pinker SA (2004). Why nature and nurture won't go away. <i>Daedalus</i> 133: 5-17.
Th/Tu Jan. 21, 26	Fundamentals of Genetics, Gene by Environment Interactions <ul style="list-style-type: none"> • Korf, BR (2004). Basic genetics. <i>Primary Care</i> 31:461-78 (<u>optional basic review – no commentary/reflection on this reading</u>) • Cooper RM, Zubek JF (1958). Effects of enriched and restricted early environments on the learning ability of bright and dull rats. <i>Canadian J Psychol</i> 12:159-64. • Scarr S, McCartney K (1983). How people make their own environments: a theory of genotype → environment effects. <i>Child Dev</i> 54:424-435. • Caspi A, McClay J, Moffitt TE, Mill J, Martin J et al. (2002). Role of genotype in the cycle of violence in maltreated children. <i>Science</i> 297:851-4.
Th. Jan. 28	<i>Article Discussion Day #1(on the articles listed immediately above)</i>
Tu/Th Feb. 2,4	Epigenetics and Parent-of-Origin Effects <ul style="list-style-type: none"> • Weaver IC, Cervoni N, Champagne FA, D'Alessio AC, et al. (2004). Epigenetic programming by maternal behavior. <i>Nature Neurosci</i> 7:847-54. • McGowan PO, Sasaki A, D'Alessio AC, Dymov S, Labonté B, et al. (2009). Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. <i>Nat Neurosci</i> 12:342-8. • Cicchetti D, Hetzel S, Rogosch FA, Handley ED, Toth SL (2016). Genome-wide DNA methylation in 1-year-old infants of mothers with major depressive disorder. <i>Dev Psychopathol</i> 28: 1413-1419. • Miller G (2010). Epigenetics. The seductive allure of behavioral epigenetics. <i>Science</i> 329(5987):24-7. (<u>No</u> commentary/reflection on this reading)
Tu Feb. 9	<i>Article Discussion Day #2 (on the articles listed immediately above)</i>
Th/Tu Feb. 11, 16	Central Nervous System Development <ul style="list-style-type: none"> • Early vertebrate development: Neurulation and ectoderm. In: Scott F. Gilbert's <i>Developmental Biology</i>, second edition. Pp. 152-173. • Fox SE, Levitt P, & Nelson CA (2010). How the timing and quality of early experiences influence the development of brain architecture. <i>Child Dev</i> 81:28-40.
Th Feb. 18	<u>MIDTERM EXAM</u> (based on lectures and readings to date)

- Tu/Th Feb. 23, 25 **Development of the Sensory World and the Emergence of Behavior**
- Rivera-Gaxiola M, Silva-Pereyra J, & Kuhl PK (2005). Brain potentials to native and non-native speech contrasts in 7- and 11-month-old American infants. *Dev Science* 8:162-72.
 - Mennella JA, Pepino MY, Reed DR (2005). Genetic and environmental determinants of bitter perception and sweet preferences. *Pediatrics* 115:e216-22.
 - Pascalis O (2002). Is face processing species-specific during the first year of life? *Science* 296 (5571):1321-23.
 - Grant-Beuttler M, Glynn LM, Salisbury AL, Davis EP, Holliday C & Sandman CA, (2011). Development of fetal movement between 26 and 36-weeks' gestation in response to vibro-acoustic stimulation. *Front Psychol*, 2:350-357. (No commentary on this reading)
- Th Mar. 4 *Article Discussion Day #3 (on the articles listed immediately above)*
- Tu/Th Mar. 9, 11 **Development of Sex Differences in Behavior and the Brain**
- Phoenix CH, Goy RW et al. (1959). Organizing action of prenatally administered testosterone propionate on the tissues mediating mating behavior in the female guinea pig. *Endocrinology* 65: 369-82.
 - Berenbaum SA, Bailey JM (2003). Effects on gender identity of prenatal androgens and genital appearance: evidence from girls with congenital adrenal hyperplasia. *J Clinical Endocrinol & Metab* 88: 1102-6.
 - Knickmeyer RC, Wang J, Zhu H, Geng X, Woolson S, et al. (2014). Impact of sex and gonadal steroids on neonatal brain structure. *Cereb Cortex* 24:2721-31.
- Tu Mar. 16 *Article Discussion Day #4 (on the articles listed immediately above)*
- Th/Tu Mar. 18*, 23 **Prenatal Drugs and Neurobehavioral Development**
- Cronise K, Marino MD, Tran TD, Kelly SJ. (2001). Critical periods for the effects of alcohol exposure on learning in rats. *Behav Neurosci* 115:138-45.
 - Kaltenbach K, O'Grady KE, Heil SH, Salisbury AL, Coyle MG et al. (2018). Prenatal exposure to methadone or buprenorphine: early childhood developmental outcomes. *Drug Alcohol Depend* 185:40-9.
 - de Salas-Quiroga, A., Díaz-Alonso, J., García-Rincón, D., Remmers, F., Vega, D., et al. 2015. Prenatal exposure to cannabinoids evokes long-lasting functional alterations by targeting CB1 receptors on developing cortical neurons. *Proc National Acad Sci* 112(44), 13693-13698.
- Th Mar. 25 *Article Discussion Day #5 (on the articles listed immediately above)*
- Tu/Th Mar.30, Apr.1 **Parental Influences on Neurobehavioral Dev I: Healthy Parenting**
- Francis D, Diorio J, Liu D, Meaney MJ. (1999). Nongenomic transmission across generations of maternal behavior and stress responses in the rat. *Science* 286:1155-8.
 - Maestripieri D, McCormack K, Lindell SG, Higley JD, Sanchez MM (2006). Influence of parenting style on the offspring's behaviour and CSF monoamine metabolite levels in cross-fostered and non-crossfostered female rhesus macaques. *Behav Brain Res* 175:90-95.
 - Sethna V, Pote I, Wang S, Gudbrandsen M, Blasi A, McCusker C, Daly E, et al. 2017. Mother–infant interactions and regional brain volumes in infancy: an MRI study. *Brain Struct Funct*, 222(5), 2379-2388.

- Tu/Th Apr. 6, 8* **Parental Influences on Neurobehavioral Dev II: Abuse, Neglect, Separation**
- McCormack K, Newman TK, Higley JD, Maestriperi D, Sanchez MM. (2009). Serotonin transporter gene variation, infant abuse, and responsiveness to stress in rhesus macaque mothers and infants. *Horm Behav* 55:538-47.
 - Kumsta R, Stevens S, Brookes K, Schlotz W, Castle J, et al. (2010). 5HTT genotype moderates the influence of early institutional deprivation on emotional problems in adolescence: evidence from the English and Romanian Adoptee (ERA) study. *J Child Psychol Psychiatry* 51:755-62.
 - Prasad M., Kramer LA, Ewing-Cobbs L. (2005). Cognitive and neuroimaging findings in physically abused preschoolers. *Arch Disease Childhood* 90(1) 82-85.

Tu Apr. 13 *Article Discussion Day #6 (on the articles listed immediately above)*

- Th Apr. 15 **Child Psychopathology - Depression, Anxiety, Aggression**
- LeMoult J, Ordaz SJ, Kircanski K, Singh MK, Gotlib IH (2015). Predicting first onset of depression in young girls: Interaction of diurnal cortisol and negative life events. *J Abnorm Psychol* 124:850-859.
 - Qin S, Young, CB, Duan X, Chen T, Supekar K, Menon V. (2014). Amygdala subregional structure and intrinsic functional connectivity predicts individual differences in anxiety during early childhood. *Biol Psychiat*, 75(11): 892-900.
 - Sanchez-Martin JR., Azurmendi A, Pascual-Sagastizabal E, Cardas J, et al. (2011). Androgen levels and anger and impulsivity measures as predictors of physical, verbal and indirect aggression in boys and girls. *Psychoneuroendocrinology* 36:750-760.

Tu Apr. 20 **END OF SEMESTER QUIZ (not cumulative; based on lectures and readings since the midterm)**

Fri Apr. 30* **FINAL PAPERS DUE**

***Important Dates to Remember:**

Th, Mar. 18 - Term paper one-page proposed topic due by end of class

Th, Apr. 8 - Outline of your term paper due by end of class

Fri, Apr. 30 - This is Friday of finals week. Submit final version of your paper in our D2L dropbox.