BISC 499: Developmental Origins of Health & Disease  
(USC Fall Semester 2021)

Instructors:
Rusty Lansford, Ph.D.
Office:
Office Hours:
Phone: 909-285-5535
E-mail: lansford@usc.edu

Meeting times:
Lecture: Tuesday and Thursday 3:30 - 4:50pm
Lab: Thursday 5:00 – 6:00pm
Lab sections will be led by Instructors and will supplement and complement lectures.

Overview:
This course explores the profound implications of the DOHaD hypothesis that suggests that the susceptibility to many adult diseases such as cardiovascular, obesity, diabetes, respiratory, certain cancers, and mental health often have pre- and peri-natal origins with multigenerational effects. Epidemiology studies have shown that nutritional, hormonal, metabolic, genetic, and environmental pollutants can significantly influence the health of children and adults by affecting the structure and physiology of cells and organs. We will deeply explore the underlying molecular mechanisms, such as epigenetic processes, that are affected by environmental stressors to shape health and disease risks over the entire life course.

Recommended preparation:
BISC 120 or 121, Introduction to Biology I
BISC 311, 320 403, Molecular Biology
BISC 325, Genetics

Texts
The Epigenome and Developmental Origins of Health and Disease (DOHaD)
Cheryl S. Rosenfeld
ISBN-10: 0128013834

The Developing Human: Clinically Oriented Embryology
By Keith Moore
Saunders; 11th edition (March 15, 2019)
ISBN-10 : 0323611540

Web Site: Course materials, additional readings, and announcements will be posted to Blackboard. You are responsible for checking the website.

Course Credit:
Midterm Exam 1 20% (10% exam & 10% DOHaD proposal #1)
Midterm Exam 2 20% (10% exam & 10% DOHaD proposal #2)
Class participation 10% (active participation in discussions is necessary)
Lab 15% (Critical thinking/problem solving DOHaD issues)
Final Exam 35% (10% exam & 25% DOHaD final proposal/presentation)

Written proposals. Short reports on student-chosen Developmental Origins of Health & Disease (DOHaD) topics. Report 1 and 2 must be on different topics. The final report can be an extension of Report 1, 2 or a third topic. Strong writing skills are essential for successful science careers. Good writers must develop their critical thinking skills and understand how to use them when writing.
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture topics</th>
<th>Reading/Videos</th>
<th>Lab</th>
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<tbody>
<tr>
<td>1</td>
<td>The Developmental Origins of Health &amp; Disease (DOHaD) Historical Perspective of DOHaD in Humans</td>
<td>Rosenfeld Ch1. The DOHaD Concept Rosenfeld Ch 2 Historical Perspective of DOHaD in Humans</td>
<td>Case study: Barker hypothesis</td>
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<td>2</td>
<td>Epigenetic Mechanisms: The Common Thread DOHaD Effects</td>
<td>Rosenfeld Ch 4. Introduction to Epigenetic Mechanisms</td>
<td>Multigenerational vs. transgenerational</td>
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<td>3</td>
<td>Transgenerational Epigenetic Inheritance</td>
<td>Rosenfeld Ch 21. Transgenerational Epigenetic Inheritance</td>
<td>Critical periods during development Cohort studies</td>
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<td>4</td>
<td>Human Developmental Biology Sensitive Periconceptional Periods Epidemiology</td>
<td>Rosenfeld Ch 22. The Placenta and DOHaD Rosenfeld Ch 3. DOHaD and the Periconceptional Period Epidemiological Studies - made easy!.mp4</td>
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<td>5</td>
<td>Environmental Triggers</td>
<td>The impact of climate change.mp4</td>
<td>Case studies: Endocrine-disrupting chemicals Effects of food insecurity Case study: Hungerwinter Case study: Birthweight and coronary heart disease</td>
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<td>6</td>
<td>Parental Nutrition and DOHaD</td>
<td>Rosenfeld Ch 6. Parental Nutrition</td>
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<td>7</td>
<td>Developmental Origins of Metabolic Disorders</td>
<td>Rosenfeld Ch14. Metabolic Disorders and DOHaD</td>
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<td>8</td>
<td>Developmental Origin of Cardiovascular Disorders</td>
<td>Rosenfeld Ch 8. Epigenetics in Cardiovascular Disorders</td>
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<td>10</td>
<td>Dr. Michael Skinner guest seminar MIDTERM 2 &amp; Two-page report #2</td>
<td>Rosenfeld Ch 12. Immune Disorders, Epigenetics, and the DOHaD Rosenfeld Ch 13. Neurobehavioral Disorders and DOHaD</td>
<td>Case study: Inflammation &amp; aging Case study: Autism</td>
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<td>11</td>
<td>Developmental Origins of Immune Disorders</td>
<td>Neuroscience and Biobehavioral Reviews, 117 (2020) 26-64</td>
<td>Case study: Transgenerational stress Case study: Breast/prostate cancer origins</td>
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<td>13</td>
<td>Prenatal Stress and the Developmental Origins of Mental Health (Dias)</td>
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<td>14</td>
<td>Cancer and DOHaD Aging</td>
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<td>15</td>
<td>Society and DOHaD DOHaD Bioethics</td>
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<td>16</td>
<td>Final Exam &amp; Presentation and final report</td>
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The syllabus may change slightly during the semester. Assignment due dates are firm.
Course Policies:
1) Exam dates are firm. **There are no makeup exams in the course.** Performance on the final may be prorated to substitute for a missing midterm exam, if an excuse considered valid by faculty is presented in a timely fashion. An acceptable written excuse or documentation must be provided to the faculty. The final exam will be administered only on the date and time set by the University.

2) Midterm exams will be returned to students by the TAs during discussion section. The final examination will not be returned but will be retained for one semester by the faculty.

3) Regrades: If you think an answer you have provided was graded incorrectly or if there is an arithmetic error, you may seek a regrade. You must provide a written explanation of why you think your answer was graded incorrectly. Regrade requests are to be submitted to your TA. If a regrade is agreed upon, then the ENTIRE EXAMINATION may be subject to a regrade. Your grade may therefore go up, go down, or remain the same. Regrade requests must be received within one week of when the exam key is posted for midterms, or by the second week of classes the following semester for the final exam.

4) No special assignments for extra credit are permitted.

5) Academic integrity policies of the University will be strictly followed. Infractions can result in severe penalties. There may be assigned seating for exams. No student may be admitted to an exam after the first student has left the exam.

**Statement on academic integrity:** USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

6) Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to one of the Professors as early in the semester as possible. DSP is located in STU 301 and is open 8:30 AM – 5:00 PM, Monday thru Friday, Phone number: 213-740-0776.

7) It may be necessary to make adjustments to the syllabus during the semester. Check the course web site or class announcements on Blackboard for updates. **Exam dates will not be changed.**

8) Any questions or concerns regarding these policies should be addressed to the faculty.
Academic Conduct:
Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems:
Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime. Provides overall safety to USC community. dps.usc.edu