

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

**Instructors:**

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Office:

Office Hours:

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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

Academic Press (2015)

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.

Week	Lecture topics	Reading/Videos	Lab
1	The Developmental Origins of Health & Disease (DOHaD) Historical Perspective of DOHaD in Humans	Rosenfeld Ch1. The DOHaD Concept Rosenfeld Ch 2 Historical Perspective of DOHaD in Humans	Case study: Barker hypothesis
2	Epigenetic Mechanisms: The Common Thread DOHaD Effects	Rosenfeld Ch 4. Introduction to Epigenetic Mechanisms	
	Transgenerational Epigenetic Inheritance	Rosenfeld Ch 21. Transgenerational Epigenetic Inheritance	Multigenerational vs. transgenerational
3	Human Developmental Biology Sensitive Periconceptional Periods	Rosenfeld Ch 22. The Placenta and DOHaD Rosenfeld Ch 3. DOHaD and the Periconceptional Period	Critical periods during development
4	Epidemiology	Epidemiological Studies - made easy!.mp4	Cohort studies
5	Environmental Triggers  <a href="#">MIDTERM 1 &amp; Two-page report #1</a>	The impact of climate change.mp4	
6	Parental Nutrition and DOHaD	Rosenfeld Ch 6. Parental Nutrition	Case studies: Endocrine-disrupting chemicals Effects of food insecurity
7	Developmental Origins of Metabolic Disorders	Rosenfeld Ch14. Metabolic Disorders and DOHaD	Case study: Hungerwinter
8	Developmental Origin of Cardiovascular Disorders  <i>Dr. Kent Thornburg guest seminar</i>	Rosenfeld Ch 8. Epigenetics in Cardiovascular Disorders	Case study: Birthweight and coronary heart disease
9	Developmental Origins of Chronic Lung and Kidney Disease	Rosenfeld Ch 11. Developmental Origins of Childhood Asthma and Allergic Conditions	Case study: LA air pollution
10	<i>Dr. Michael Skinner guest seminar</i> <a href="#">MIDTERM 2 &amp; Two-page report #2</a>		
11	Developmental Origins of Immune Disorders	Rosenfeld Ch 12. Immune Disorders, Epigenetics, and the DOHaD	Case study: Inflammation & aging
12	Neurobehavioral Disorders and DOHaD	Rosenfeld Ch 13. Neurobehavioral Disorders and DOHaD	Case study: Autism
13	Prenatal Stress and the Developmental Origins of Mental Health (Dias)	Neuroscience and Biobehavioral Reviews, 117 (2020) 26-64	Case study: Transgenerational stress
14	Cancer and DOHaD  Aging	Rosenfeld Ch 16. Cancer and DOHaD  Nat. Rev. Genet. 19, 371–384 (2018)	Case study: Breast/prostate cancer origins
15	Society and DOHaD  DOHaD Bioethics	Rosenfeld Ch 23. The Moral and Legal Relevance of DOHaD	
16	<a href="#">Final Exam &amp; Presentation and final report</a>		

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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://dps.usc.edu)