Course Title: Diet and Gene Expression: You Are What You Eat  
Course Code: BIO 03 W  
Instructor: Lucia Aronica, PhD

Course Summary:  
There is a give and take between our genes and the food we eat: genes affect nutrient response through genetics, while nutrients affect gene activity through epigenetics. This is a course for those interested in understanding the basic science of diet-gene interactions, and bringing it into their kitchen to optimize their health and defense against disease.

*Please see course page for full description and additional details.*

Grade Options and Requirements:
- No Grade Requested (NGR)  
  - This is the default option. No work will be required; no credit shall be received; no proof of attendance can be provided.
- Credit/No Credit (CR/NC)  
  - Students must participate in at least 70% of weekly discussions and/or Zoom sessions.
- Letter Grade (A, B, C, D, No Pass)  
  - Students must participate in at least 70% of weekly discussions and/or Zoom sessions, and complete a final project (to be discussed further in class).

*Please Note: If you require proof that you completed a Continuing Studies course for any reason (for example, employer reimbursement), you must choose either the Letter Grade or Credit/No Credit option. Courses taken for NGR will not appear on official transcripts or grade reports.*

Tentative Zoom Schedule:  
Zoom sessions are scheduled for Fridays at 12pm PT (midday) each week. However, please note that this schedule is subject to change on short notice, depending on guest speaker availability.
<table>
<thead>
<tr>
<th>Week</th>
<th>Zoom sessions and readings/media</th>
<th>Videos</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td><strong>My research at Stanford</strong></td>
<td>V1: Welcome</td>
</tr>
</tbody>
</table>
| 1    | **Zoom session**  
Week recap + Q&A  
**Required readings/media**  
My blackboard videos on epigenetics:  
Epigenetics Intro  
Epigenome and Environment  
Short video: *Insights from identical twins*, University of Utah  
Research news: *Hidden Treasures in Junk DNA*  
**Additional resources**  
Epigenetic analysis in the DIETFITS study (Dr. Lucia Aronica and Prof. Christopher Gardner):  
https://www.youtube.com/playlist?list=PLU7a7O4lr4QAtwQ0Ksxi0YTdQ3Z-QSP6  
Research news: *Researchers take a gamble on the human genome*  
Video: *Human Genome Announcement at the White House (2000)*  
Media coverage: *Epigenetics 101*  
Epigenetics (Scitable by Nature Education)  
https://www.nature.com/scitable/spotlight/epigenetics-26097411  
Website: Learn.Genetics (Univeristy of Utah)  
http://learn.genetics.utah.edu/content/epigenetics/  
**Deep dives:**  
Review article: Feil R, Fraga MF (2012). Epigenetics and the
| 2 | **Zoom session** | V5: Epigenetics at work  
V6: Diet and epigenetics |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interview with Prof Randy Jirtle</td>
<td></td>
</tr>
</tbody>
</table>

**Required readings/media**

Research news:
- *Mother’s diet changes pups’ colour* (2003)
- *Famine leaves scars on Dutch genes*, New York Times Jan 31 2018

**Additional resources:**

Video lecture: [Epigenetics and Diet](#)

BBC Radio show: [Can Your Lifestyle Be Passed on to Future Generations?](#)

Website: [EpiGenie: Epigenetics Background](#)

Website: [Genomic Imprinting](#) Learn.Genetics (Univeristy of Utah)

**Deep dives**

Allis CD, Jenuwein, T (2016, Nat Rev Genet)
*The molecular hallmarks of epigenetic control*


Review article: Krishnakumar R, Bleloch RH. (2013)
Epigenetics of cellular reprogramming. Curr Opin Genet

Review article: Abramowitz LK, Bartolomei MS. (2012)
Genomic imprinting: recognition and marking of imprinted loci

**Epigenetic writers and readers**

**Epigenetics of Royalty**

**Persistent epigenetic modifications in Dutch famine babies**

**Obesity changes sperm epigenome**

**Epigenetic changes due to physical activity. (2018)**

Research reviews:
The Dutch Hunger Winter and the developmental origins of health and disease

Book chapter: Environmental Epigenomics in Health and Disease, Chapter 1. Courtesy of Prof Randy Jirtle (see Canvas supplemental materials)


<table>
<thead>
<tr>
<th>13061.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobi EW et al (2018, Science Advances)</td>
</tr>
<tr>
<td>Schultz LC (2010, PNAS). The Dutch Hunger Winter and the developmental origins of health and disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th><strong>Zoom session</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Week recap + broccoli sprouts DIY demo</td>
<td></td>
</tr>
</tbody>
</table>

**Required readings/media**

EPI-nutrient summary: SOUL-food insights_Lucia Aronica

Broccoli sprouts vs. supplements

Research news:

Could eating broccoli starve out cancer?

The Epigenetic Benefits of Your Thanksgiving Feast

**Deep dives:**

Epigenetics and Nutritional Environmental Signals

Mentch SJ and Locasale JW (PNAS 2015) One Carbon Metabolism and Epigenetics: Understanding the Specificity


<table>
<thead>
<tr>
<th>V7: Intro to Nutrigenomics</th>
</tr>
</thead>
<tbody>
<tr>
<td>V8: Methyl-donating nutrients: Folate</td>
</tr>
<tr>
<td>V9: Nutrigenomic modulators: Sulforaphane</td>
</tr>
</tbody>
</table>


**Food fortification with folic acid**

**Vegetarians and B12**

**Bioavailability and inter-conversion of sulforaphane and erucin in human subjects consuming broccoli sprouts or broccoli supplement in a cross-over study design.**

**Sulforaphane, epigenetic writers and erasers**

**DNA damage and repair activity after broccoli intake in young healthy smokers**

**Broccoli help detox your body from air pollutants**

**Food source B-vitamins may modify the effect of DNAm-related variant on long-term adiposity change. (2018)**

**Fighting Breast cancer with EPI-nutrients**

**Mustard seeds to pump up your sulforaphane**

<table>
<thead>
<tr>
<th>4</th>
<th>Zoom session</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Interview with Prof Michael Skinner</td>
</tr>
</tbody>
</table>

**Required readings/media**

TEDx Talk: [Ancestral ghosts in your genome | Michael Skinner | TEDx](https://www.ted.com/talks/michael_sklar_ancestral_ghosts_in_your_genome)

Research news: [Could chemotherapy affect future generations?](https://www.nature.com/articles/d41586-018-02145-0)

**Dogs Exposed to BPA Give Us Epigenetic Clues About Our Own Wellbeing**

V10: Environmental epigenetics and EPI-toxins

Please contact the Stanford Continuing Studies office with any questions
365 Lasuen St., Stanford, CA 94305
continuingstudies@stanford.edu
650-725-2650
Sperm exposure to plastic compounds affects embryo in humans

Phthalates increase the risk of allergies among children

**Additional resources**

**Scorecards: Toxins by ZIP-CODENYT Page on BPA**

**Deep dives** (for those who want to read about the science behind the topic):

Research articles

- **Sperm epimutation biomarkers for specific diseases** (Skinner, 2018)

- **Maternal nutrient supplementation counteracts bisphenol A-induced DNA hypomethylation in early development**

- **Epigenetic effects of BPA and phthalates, Skinner lab 2012**

- **Epigenetic effects of chemotherapy on sperm cells, Skinner lab 2016**

- **In utero phthalate exposure is associated with DNA methylation of growth-related genes in human placenta and fetal grow restriction**

- **Epigenetic effects of phthalate and childhood asthma**

Research reviews:

- **Epigenetic translational inheritance of EDC exposure**

- **Epigenetic Effects of Environmental Chemicals Bisphenol A and Phthlates**

- **The burden of endocrine-disrupting chemicals in the USA**

- **Understanding Epigenetic Effects of Endocrine Disrupting Chemicals: from Mechanisms to Novel Test Methods.**

5 **Zoom session**

V11: Intro to Nutrigenetics
Interview with Dr. Daniel Stickler

**Required readings/media**

- *A personalized diet, better suited for you*, NYT (2016)
- *Test your genes to find your best diet* – WSJ (2016)

**Ancient DNA can both diminish and defend modern minds**

**Additional resources**

- Promethease
- SNPedia

**Deep dives** (for those who want to read about the science behind the topic):

- Research articles and reviews:
  - *Protective alleles and modifier variants in human health and disease*
  - *MTHFR alleles in human*
  - *MTHFR and decreased prostate cancer risk*
  - *ApoE, DHA and Alzheimer's disease*
  - *APOE ε4 Is Not Associated with Alzheimer's Disease in Elderly Nigerians*
  - *Effect of APOE ε4 allele on survival and fertility in an adverse environment*
  - *Apolipoprotein E4 is associated with improved cognitive function in Amazonian forager-horticulturalists with a high parasite burden*
  - *Genetic variation at the FADS1-FADS2 gene locus influences delta-5 desaturase activity and LC-PUFA proportions after fish oil supplement*
  - *AGTR1, salt and hypertension*

**V12: Nutrigenetics in direct-to-consumer DNA testing**
| **ADDUCIN, salt and hypertension** |
| **Coffee, CYP1A2, and risk of heart disease** |