

**HUN6936/HUN4936**  
**Nutritional Epigenomics and Metabolic Disease**  
**Fall 2020 – Section 18F2/18FC**



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**Office hours:** Wednesdays 9:00 – 10:00 am  
\*If you cannot make my regularly scheduled office hours, you may e-mail me to schedule an appointment.

**Class location and meeting times:** R: Period 7 (1:55 – 2:45 pm), WEIM 2056

**Attendance:** Required  
**Credits:** 1

**Course Description and Prerequisites:** This course discusses nutrient-gene interactions, and how they regulate gene and protein expression in metabolic health and disease. Specifically, the course covers the basis of epigenetics (i.e., DNA methylation, histone modification, and non-coding RNA), the dietary and nutritional contributions to epigenetic programming of metabolism, and epigenetic mechanisms underlying metabolic disease risks (e.g., obesity, diabetes, cardiovascular disease, and cancer) across generations. The cutting-edge research evidence will be discussed and used for problem solving activities.

Prerequisites for Undergraduates: BSC 2010 and BSC 2010L or equivalent; Pre-requisites for Graduate Students: M.S. or Ph.D. student in life sciences.

**Course Learning Objectives:** By the end of this course, students will be able to

1. Explain the molecular events of epigenetic programming.
2. Interpret the epigenetic roles of diets or nutrients in metabolic disease.
3. Identify gaps and handle controversies in current literature.
4. Apply epigenetics knowledge and research evidence to real-life issues.
5. Design studies or projects to address the identified research questions.
6. Present and justify scientific positions or research ideas.

This course uses the e-Learning (Canvas) system for postings of various class materials, as well as scores for exams and other assignments. Access to e-Learning requires a Gatorlink account. To establish a Gatorlink account, go to <http://www.gatorlink.ufl.edu/>. Once you have created an account, access the e-learning homepage at <http://elearning.ufl.edu/>. Continue with e-Learning Login using your Gatorlink ID.

**Textbook:** None required. The required readings are enclosed at the end of this syllabus. In addition, Power Point slides and reading assignments from various sources (e.g. textbook chapters, current review articles, etc.) will be posted at Canvas.

**Attendance and Make-Up Work**

In accordance with the University of Florida's policy: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>, class attendance and participation are mandatory. Students will behave in an appropriate manner in class, taking care not to disrupt other students learning activities. Students are asked to be punctual and submit assignments on time. Make-up work and assignments are consistent with university policies (visit the link sown above).

### Student Evaluation:

The assessments will be comprised of 5 quizzes (24 points each), 3 assignments (50 points each), and a final project: position paper or research proposal (writing – 70 points, and oral presentation -60 points). Quizzes and assignments will be administered in class. Quizzes will be 30-min timed and administered on Canvas. Each quiz (closed book) contains 8 'choose an answer among multiple choices' questions and 2 short-answer questions. Assignment instructions and grading rubrics will be posted at Canvas.

Quizzes must be taken when scheduled. The lowest quiz grade will be dropped and four quiz grades will be counted towards the final grade (%). A missed quiz will count as the dropped quiz. Any other missed quizzes will result in a grade of "0" unless there are unavoidable extenuating circumstances (subject to our discretion) that can be documented to our satisfaction. Extenuating circumstances include unavoidable, unplanned situations such as illness (chart note from physician or clinic; vague notes such as "was seen" are not acceptable); family death (dated obituary); accident (police report); or an interview at a professional school (official invitation), etc. An excused, documented absence from a quiz will result in the grade for the missed quiz being calculated as the average of the other quizzes.

Grade Breakdown	Undergraduate (Points)	Graduate (Points)
Quizzes	120	120
Assignments: Paper discussion/snapshot prep	N/A	150
Assignments: Paper discussion	150	N/A
Final: Position paper	70	N/A
Final: Research proposal	N/A	70
Final presentation (Position paper or Research proposal)	60	60
Total	400	400

Grading scale (Grades are not curved or negotiable):

A = 370-400 92.5-100%	A- = 358-369 89.5-92.25%	B+ = 346-357 86.5-89.25%	B = 330-345 82.5-86.25%	B- = 318-329 79.5-82.25%	C+ = 306-317 76.5-79.25
C = 290-305 72.5-76.25%	C- = 278-289 69.5-72.25%	D+ = 266-277 66.5-69.25%	D = 250-265 62.5-66.25%	D- = 238-249 59.5-62.25%	E = <238 <59.5%

### Current UF Grading Policies

Please see the following link for information on grade point equivalencies:  
<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>

### Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*" You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment.*"

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for

consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.

**Services for Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Contact information: 0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

**Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

Service	Location	Phone	Web site	Services provided
University Counseling and Wellness Center	3190 Radio Road	352-392-1575	<a href="http://www.counseling.ufl.edu/cwc/">www.counseling.ufl.edu/cwc/</a>	<ul style="list-style-type: none"> <li>• Counseling Services - individual and group</li> <li>• Groups and Workshops</li> <li>• Outreach and Consultation</li> <li>• Self-Help Library</li> <li>• Wellness Coaching</li> <li>• Training Programs</li> <li>• Community Provider Database</li> </ul>
U Matter We Care		352-294-CARE	<a href="http://www.umatter.ufl.edu">www.umatter.ufl.edu</a>	Care-related programs and resources for students and employees
Career Connections Center	Wayne Reitz Union (1st Floor)	352-392-1601	<a href="https://career.ufl.edu/">https://career.ufl.edu/</a>	Career development assistance and counseling

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Student Complaints:**

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>.
- Online Course: <https://distance.ufl.edu/student-complaint-process/>

**Software Use:**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or

criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

**Virtual class:** Due to the COVID-19 pandemic, the class will be administered online synchronously. Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

**Other Information:** Lecture materials and other information are the property of the University of Florida and the course instructor and may not be used for any commercial purpose. Students found in violation may be subject to disciplinary action under the University's Student Conduct Code. Only students formally registered for the course are permitted to attend lectures and take exams.

*We the members of the University of Florida community pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*

**Email:** Students are required to check their email account(s) daily (at least Monday through Friday) and respond to course/program related requests, inquiries, etc. in a timely manner.

**Topics and Schedule:** (subject to change)

<b>Classes/Dates</b>	<b>Topics</b>	<b>Notes</b>
1 (9/3, R)	Class overview and project initiation	
2 (9/10, R)	Introduction to Epigenomics	
3 (9/17, R)	Vitamins and epigenomics (I)	<ul style="list-style-type: none"><li>• Quiz 1</li></ul>
4 (9/24, R)	Vitamins and epigenomics (II)	<ul style="list-style-type: none"><li>• Assignment 1a</li><li>• Meeting with Dr. Cheng: 9/23, Wed at 9:00 am</li></ul>
5 (10/1, R)	Minerals and epigenomics (I)	<ul style="list-style-type: none"><li>• Quiz 2</li></ul>
6 (10/8, R)	Minerals and epigenomics (II)	<ul style="list-style-type: none"><li>• Assignment 1b</li></ul>
7 (10/15, R)	Macronutrients and epigenomics (I)	<ul style="list-style-type: none"><li>• Quiz 3</li></ul>
8 (10/22, R)	Macronutrients and epigenomics (II)	<ul style="list-style-type: none"><li>• Assignment 2a</li></ul>
9 (10/29, R)	Epigenomics in aging, diabetes, and obesity (I)	<ul style="list-style-type: none"><li>• Quiz 4</li></ul>

10 (11/5, R)	Epigenomics in aging, diabetes, and obesity (II)	<ul style="list-style-type: none"> <li>• Assignment 2b</li> <li>• Meeting with Dr. Cheng: 11/4, Wed at 9:00 am</li> </ul>
11 (11/12, R)	Epigenomics in CVD and cancer (I)	<ul style="list-style-type: none"> <li>• Assignment 3a</li> </ul>
12 (11/19, R)	Epigenomics in CVD and cancer (II)	<ul style="list-style-type: none"> <li>• Quiz 5</li> <li>• Assignment 3b</li> </ul>
13 (11/26, R)	No class (Thanksgiving break)	
14 (12/3, R)	Position Paper/Research Proposal presentation	<ul style="list-style-type: none"> <li>• Papers due 11:00 pm</li> </ul>

### Suggested Readings

- [1] Epigenetics in Human Obesity and Type 2 Diabetes. *Cell Metab.* 2019 May 7;29(5):1028-1044.
- [2] DNA methylation markers in obesity, metabolic syndrome, and weight loss. *Epigenetics.* 2019 May;14(5):421-444.
- [3] Epigenetic reprogramming in metabolic disorders: nutritional factors and beyond. *J Nutr Biochem.* 2018 Apr;54:1-10.
- [4] The effects of bariatric surgery on clinical profile, DNA methylation, and ageing in severely obese patients. *Clin Epigenetics* 2020 Jan 20;12(1):14. doi: 10.1186/s13148-019-0790-2.
- [5] Gene-specific DNA methylation in newborns in response to folic acid supplementation during the second and third trimesters of pregnancy: epigenetic analysis from a randomized controlled trial. *Am J Clin Nutr.* 2018 Apr 1;107(4):566-575.
- [6] Perinatal phthalate and high-fat diet exposure induce sex-specific changes in adipocyte size and DNA methylation. *J Nutr Biochem.* 2019 Mar; 65:15-25.
- [7] DNA methylation and one-carbon metabolism related nutrients and polymorphisms: analysis after mandatory flour fortification with folic acid. *Br. J. Nutr.* 2020, 123, 23–29.
- [8] Genome-wide profiling of histone H3K27 acetylation featured fatty acid signalling in pancreatic beta cells in diet-induced obesity in mice. *Diabetologia.* 2018 Dec;61(12):2608-2620.
- [9] The histone demethylase Phf2 acts as a molecular checkpoint to prevent NAFLD progression during obesity. *Nat Commun.* 2018 May 29;9(1):2092.
- [10] Fasting-induced JMJD3 histone demethylase epigenetically activates mitochondrial fatty acid  $\beta$ -oxidation. *J Clin Invest.* 2018 Jul 2;128(7):3144-3159. doi: 10.1172/JCI97736. Epub 2018 Jun 18.
- [11] Insulin/Snail1 axis ameliorates fatty liver disease by epigenetically suppressing lipogenesis. *Nat Commun.* 2018 Jul 16;9(1):2751. doi: 10.1038/s41467-018-05309-y.
- [12] Hepatic Ago2-mediated RNA silencing controls energy metabolism linked to AMPK activation and obesity-associated pathophysiology. *Nat Commun.* 2018 Sep 10;9(1):3658.