

Proteins and Amino Acids in Human Nutrition

HUN 6321

Class Periods & Location:

Tuesday Periods 4-5 (10:40 AM-12:35 PM) in LEI 0104

Thursday Period 4 (10:40 AM-11:30 AM) in MCCA 2186

Academic Term:

Fall 2023

Instructor:

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Office Hours: Mondays and Wednesdays 12-1 pm or by appointment

Course Description

The course covers all aspects of protein/amino acid nutrition and metabolism in humans including digestion, absorption, metabolism, and the concept of protein turnover. Students learn the scientific bases for determining dietary protein quality and estimating protein requirements in health and disease.

Course Pre-Requisites / Co-Requisites

BCH 3025

Course Objectives

- Explain protein digestion, absorption, metabolism, and turnover
- Explain the impact of particular life stages and clinical conditions on protein turnover
- Compare methodologies used to determine dietary protein quality
- Compare methodologies used to determine dietary protein requirements
- Identify scientific controversies and critically evaluate the literature
- Justify scientific positions and research ideas

Electronic Course Reserves

PDF of Chapters: 9, 15, and 19 in Biochemical, Physiological, and Molecular Aspects of Human Nutrition

Editors: Martha H. Stipanuk, Marie Caudill

Publication year: 2019

ISBN: 9780323441810

Download through Course Reserves link on the HUN 6321 Canvas page

Other required reading is listed in the course schedule and is available electronically through UF Libraries.

Final Exam Period:

December 15 from 12:30-2:30 PM

e-Learning (Canvas)

This course uses Canvas for posting of lectures and assessment scores and to administer quizzes. 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/>. You will take the quizzes during class and must bring a device to class to access Canvas on quiz days.

Lecture Notes

Class lecture notes will be posted in Canvas by 7:00 PM the day before the lecture.

Course Schedule (subject to change)

Date	Topic	Reading (complete in advance)	Assessment
08/24 (Th)	Introduction to course	Syllabus	Quiz 1
08/29 (Tu)	Lecture: Structure, nomenclature, and properties of proteins and amino acids Discussion: Philips (2016) and Heyland (2023)	Philips (2016). Protein “requirements” beyond the RDA: Implications for optimizing health. DOI: 10.1139/apnm-2015-0550 Heyland (2023). The effect of higher protein dosing in critically ill patients with high nutritional risk (EFFORT Protein). DOI: 10.1016/S0140-6736(22)02469-2	
08/31 (Th)	Lecture: Digestion and absorption of proteins	Ch. 9: Digestion and absorption of protein. In Stipanuk and Caudill 2019. (Electronic course reserves)	
9/5 (Tu)	Lecture: Evaluation of dietary protein quality in humans	Ch. 19. Protein and Amino Acid Requirements. Pages 555-563. In Stipanuk and Caudill 2019. (Electronic course reserves) Rutherford (2022). Evaluation of Protein Quality in Humans and Insights on Stable Isotope Approaches to Measure Digestibility – A Review. DOI: 10.1093/advances/nmab134	Quiz 2
9/7 (Th)	Discussion: Rutherford (2015)	Rutherford (2015). PDCAAS and DIAAS Differentially Describe Protein Quality in Growing Male Rats. https://doi.org/10.3945/jn.114.195438 Optional reading: Fanelli (2022). Digestible indispensable amino acid score (DIAAS) is greater in animal-based burgers than in plant-based burgers if determined in pigs. https://doi.org/10.1007/s00394-021-02658-1 .	
9/12 (Tu)	Lecture: Protein Metabolism I - overview; synthesis of semi-essential and non-essential amino acids; transfer of amino groups; protein turnover	Ch. 15: Protein and Amino Acid Metabolism. Pages 402-412. In Stipanuk and Caudill 2019. (Electronic course reserves)	
9/14 (Th)	Lecture: Protein Metabolism II – cell and molecular biology of protein synthesis and degradation	Ch. 15: Protein and Amino Acid Metabolism. Pages 413-431. In Stipanuk and Caudill 2019. (Electronic course reserves)	
9/19 (Tu)	Discussion: Costa-Mattioli (2020) and Ball (2023)	Costa-Mattioli (2020). The integrated stress response: From mechanism to disease. https://doi.org/10.1126/science.aat5314	Assignment 1 explained

		Ball (2023). 3' Untranslated Region Structural Elements in CYP24A1 are Associated with Infantile Hypercalcemia Type 1. https://doi.org/10.1002/jbmr.4769	
9/21 (Th)	Lecture Protein Metabolism III – synthesis of nonprotein compounds; amino acid catabolism and nitrogen excretion; protein metabolism during growth and stress	Ch. 15: Protein and Amino Acid Metabolism. Pages 431-443. In Stipanuk and Caudill 2019. (Electronic course reserves)	
9/26 (Tu)	Discussion: Green (2021)	Green (2021) Molecular mechanisms of dietary restriction promoting health and longevity. https://doi.org/10.1038/s41580-021-00411-4	
9/28 (Th)	Student presentations	None	Assignment 1 due before class
10/3 (Tu)	Student presentations	None	
10/5 (Th)	Lecture: Metabolism of nonessential amino acids	Optional reading: Ch. 16: Metabolism of Individual Amino Acids. In Stipanuk and Caudill 2019. (Physical course reserves, Marston Library)	
10/10 (Tu)	Guest Lecture: Tim Garrett, PhD. Associate Professor, University of Florida. Topic: Basic Concepts in Mass Spectrometry	TBD	
10/12 (Th)	Lecture: Metabolism of essential amino acids	Optional reading: Ch. 16: Metabolism of Individual Amino Acids. In Stipanuk and Caudill 2019. (Physical course reserves, Marston Library)	Quiz 3
10/17 (Tu)	Discussion	TBD	
10/19 (Th)	Lecture: Techniques to determine dietary protein requirements	Ch. 19: Protein and Amino Acid Requirements. Pages 540-546. In Stipanuk and Caudill 2019. (Electronic course reserves)	
10/24 (Tu)	Discussion	Rand (2003). Meta-analysis of nitrogen balance studies for estimating protein requirements in healthy adults. https://doi.org/10.1093/ajcn/77.1.109	
10/26 (Th)	Guest Lecture: Brian Irving, PhD. Associate Professor, Pennington Biomedical Research Center. Topic: Methods in Protein Metabolism	TBD	
10/31 (Tu)	Discussion	TBD	

11/2 (Th)	Lecture: Dietary protein requirements in pregnancy, lactation, and growth	Ch. 19: Protein and Amino Acid Requirements. Pages 546-554. In Stipanuk and Caudill 2019. Pages 12-30. (Electronic course reserves)	
11/7 (Tu)	Discussion	TBD	Assignment 2 explained
11/9 (Th)	Guest Lecture: Huu Hien Huynh, PharmD, PhD. Postdoctoral Fellow, University of Washington. Topic: Mass Spectrometry for Peptide Quantification	TBD	
11/14 (Tu)	Lecture: Dietary protein requirements – inadequacy, upper limits, and other considerations	Ch. 19: Protein and Amino Acid Requirements. In Stipanuk and Caudill 2019. Pages 563-568. (Electronic course reserves)	
11/16 (Th)	Discussion	TBD	Quiz 4
11/21 (Tu)	Lecture: Dietary protein requirements in chronic kidney disease (CKD)	None	Assignment 2 due before class
11/28 (Tu)	Assignment 2 presentations	None	
11/30 (Th)	Assignment 2 presentations	None	
12/5 (Tu)	Final review and clarification of concepts	None	
12/15 (Fr) 12:30- 2:30PM	Final Exam	None	Exam

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is required and will be monitored by the instructor. In the event of excused absence, make up quizzes will be scheduled as needed. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Assignments (2)	50 each	25%
Quizzes (4)	25 each	25%
Lead discussion	50	12.5%
Attendance & participation	50	12.5%
Final Exam	100	25%
TOTAL	400	100%

Grading Policy

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 – 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 – 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with the instructor and discuss their access needs as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

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

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources

Health and Wellness

- U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.
- Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.
- Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need or visit the Student Health Care Center website.
- University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).
- UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road,
- Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.
- GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

Academic Resources

- E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- Library Support: Several ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.
- On-Line Students Complaints: View the Distance Learning Student Complaint Process