

MINERALS IN NUTRITION (HUN 6356) (3 credits); Spring Semester 2023
Class Meetings: Tuesday, Thursdays, 1:00-2:15 p.m.; APL, room 0101

FOCUS: (Patho)Physiological aspects of the essential minerals. Including consideration of **1)** Dietary sources, intestinal absorption, transport and distribution, storage, and excretion of minerals; **2)** Homeostatic and molecular regulation of mineral metabolism; **3)** Pathophysiological outcomes associated with deficiencies and excesses of minerals; **4)** Interactions among the essential minerals; **5)** Connections between minerals and human disease; **6)** Current, cutting-edge research on minerals.

LEARNING OBJECTIVES:

- Explain the mechanisms by which dietary minerals are absorbed from food and supplements
- Describe homeostatic and molecular regulation of mineral metabolism
- Summarize the relationship between mineral intake/metabolism and chronic disease in humans
- Evaluate mineral-related research as it relates to mammalian (and human) physiology and pathophysiology
- Design a mineral-based research project with physiological/pathophysiological significance

Instructor: James F. Collins, Ph.D., Professor; Food Science & Human Nutrition Department

Location/Contact Info: FSHN Bldg., Rm 441A; phone: 294-3749; email: jfcollins@ufl.edu

Office Hours: By prior arrangement (email is fine)

Recommended Resources (available at UF libraries in print and online):

Ross, A. Catharine. **Modern Nutrition in Health and Disease.** Eleventh edition / editors, A. Catharine Ross [and four others]. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2014. Print.

Marriott, Bernadette P. et al. **Present Knowledge in Nutrition.** Volume 1, Basic Nutrition and Metabolism. Ed. Bernadette P. Marriott et al. Eleventh edition. London, United Kingdom; Academic Press, an imprint of Elsevier, 2020. Print.

Linus Pauling Institute, Micronutrient Information Center (<https://lpi.oregonstate.edu/mic>)

Class Meetings: Classes will be discussion oriented, relating to posted PPT files and associated reading assignments, or to translational or basic-science papers from the primary literature. Dr. Collins will make the materials available to the students in advance and will also select the research papers to be covered. Attendance is encouraged and expected. **No makeup exams or quizzes will be given** (unless an emergency can be documented by the student; in this case, giving a makeup will be at the discretion of the instructor). No late assignments will be accepted. All missed assignments will be given a score of '0'.

<u>Assessment</u>	<u>Points</u>
Exam 1	100
Exam 2	100
Research Project	100 (Aims pg. [15]; presentation [25]; write up [60])
Quizzes	50 (5 x 10 points each)
Leading Research Paper Discussion	25 points
In-class Participation	25 points
<u>TOTAL POINTS AVAILABLE</u>	<u>400</u>

Grade Determination: A = 90-100%; B+ = 88-89.99%; B = 80-87.99%; C+ = 78-79.99%; C = 70-77.99%

Exams (200 total points): Exams will consist of a series of free response/discussion questions. The topics covered on exams will relate to the material discussed in class, assigned readings and research articles reviewed. The scope of answers to exam questions is at the discretion of each individual student, but they should be of sufficient length and rigor to adequately address the topic.

Research Paper Presentation (25 points): Each student will be assigned a research paper and will lead the class discussion on that paper. Students are encouraged to discuss their paper with Dr. Collins in advance. Creative ways to generate discussion may be implemented and are encouraged.

Research Project (100 total points): Each student will select a (hypothetical) **minerals-related research topic** of interest and prepare a mock grant application. The topic may (or may not) directly relate to the students' thesis/dissertation research topic. It would, however, be advantageous to model the proposal after the student's research project (e.g., using similar experimental techniques and models). The focus of the project should have relevance to human health and disease. Investigations using animal models of human disease are acceptable, if a strong and cogent rationale is provided (i.e., why if this species [e.g., mice] a good model for this human condition?). It is advisable that each student meet with Dr. Collins to discuss potentially acceptable topics. The scope of the project should allow completion in 2 years, and it should be conceptually modeled after an R21 grant application to the NIH ([R21 Grant Info](#)). This is an exploratory type of grant (i.e., high risk, high reward) that does not require preliminary data, just a good idea. Project topics will initially be discussed in class on Jan. 17 and specific aim pages will be peer-reviewed in class on Jan. 31. The finalized AIMS pages will be due to Dr. Collins on Feb. 16, while the entire project will be due on April 4. The research proposals will be presented by students on the last 2 days of class.

Proposal Formatting Requirements: Arial, 11-point font; margins 0.5 inches on all sides; single spaced; printed on one side. The paper must include the following sections:

- 1) Cover page with student's name, UF ID and title of grant proposal
- 2) Specific Aims page (one page)- format will be discussed in class
- 3) Background and Significance (one page)
- 4) Approach (2-3 pages), should include the following sections:
 - i) Experimental approaches and models used utilized to test central hypothesis
 - ii) Anticipated results (be thoughtful)
 - iii) Potential pitfalls (what could go wrong? - something usually does!)
 - iv) Alternative hypotheses and related experimental approaches (if, for example, the central hypothesis is disproven)
- 5) References (one page)- no more than 20

Research Project Presentation: Each student will present their research project to the class on the last 2 days of class (April 13 and 18). Each student will have 15 minutes for their presentation with 5 minutes for questions/discussion. The presentations should include the following elements: rationale for choosing topic; background and significance leading to the central hypothesis to be tested; the experimental approach, including methods and the model systems to be utilized; anticipated results and possible alternative hypotheses/approaches; and potential impact and future studies.

Quizzes (50 total points): Five quizzes will be given on random, unannounced days throughout the semester. Topics of quizzes may include information provided on PowerPoint slides, assigned readings or research papers being reviewed.

Class Schedule (subject to change)

<u>DATE</u>	<u>TOPIC / ACTIVITY</u>
JAN	
10 (T) [‡]	Course Intro
12 (R)	Minerals: Overview
17 (T)	Writing Research Grants / Discussion of Research Project Topics
19 (R)	GI tract physiology / Mechanisms of mineral absorption / Mineral interactions
24 (T)	Iron
26 (R)	Iron
31(T)	Iron ***Peer review of specific AIMs pages***
FEB	
2 (R)	Copper
7 (T)	Copper
9 (R)	Copper
14 (T)	Electrolytes (Na, K, Cl)
16 (R)	Ultra-trace Minerals ***Specific AIMs pages due by 1:00 p.m.***
21 (T)	Exam 1
23 (R)	Chromium
28 (T)	Manganese
MAR	
2 (R)	Zinc
7 (T)	Zinc
9 (R)	Zinc
14 (T)	NO CLASS (SPRING BREAK)
16 (R)	NO CLASS (SPRING BREAK)
21 (T)	Iodine
23 (R)	Fluoride
28 (T)	Calcium
30 (R)	Calcium
APRIL	
4 (T)	Phosphorus ***Grant Proposals due by 1:00 p.m.***
6 (R)	Magnesium
11 (T)	Exam 2
13 (R)	Grant Proposal Presentations
18 (T)	Grant Proposal Presentations

[‡]T = Tuesday; R = Thursday