

FN 605/ANSC 625 Nutritional Biochemistry and Physiology 1

4 credits

M,W 10:30 am -12:20 pm

	<u>Names</u>	<u>Phone</u>	<u>email</u>
I. Instructors:	Dorothy Teegarden	494-8246	dteegard@purdue.edu
	James Fleet	494-0302	fleet@purdue.edu
	Connie Weaver	494-8237	weavercm@purdue.edu

II. Purpose:

- (1) To provide a foundation in scientific concepts, biochemistry and physiology relevant to nutrient metabolism and nutrient-disease interactions.
- (2) To explore, in depth, important and current issues in nutrition.
- (3) To increase skills important to a career in nutrition science, e.g. critical thinking skills, reading and discussing current scientific literature, writing scientific works.

III. Content: See Attached sheet for detailed contents

Section 1	Aug 27-Sept 22	Protein Synthesis and Degradation Core Instructor: J. Fleet
Section 2	Sept 24-Oct 31	Gut Physiology, Digestion and Absorption Core Instructor: Dorothy Teegarden
Section 2	Nov 3-Dec 10	Mineral Metabolism Core Instructors: J. Fleet, Connie Weaver

IV. Basic concepts to be introduced in this semester:

- Cell Communication
 - Signal transduction
 - Transcriptional regulation
 - Endocrine-autocrine-paracrine signalling
- Cell Life Cycle
 - Proliferation and Cell Cycle
 - Differentiation
 - Programmed Cell Death/Apoptosis
- Balance
 - Whole body
 - Protein synthesis vs degradation
 - Enzymology
- Structure-function relationships
 - Micronutrients as co-factors and co-enzymes
 - Protein-nucleic acid
 - Protein-protein interactions

Methodology
Nutrient Status Assessment
 Dietary assessment (basics)
 Functional vs Static assessment tests
Molecular analysis of cell biology
Nutrient kinetics
Radioisotopes

V. Skills to be developed in this semester:

Read research articles
Critically evaluate research articles
Discuss the content of research articles
Write technical summaries of research articles

VI. Evaluation:

	Points
Exam 1 ¹ (30 min. mini exam)	40
Exam 2 ¹	160
Exam 3 ¹	200
Final Exam ¹	200
Writing Assignments	200
Class Participation	200
Total	1000

¹*No makeup exams will be given*

Exam 1: In-class exam (1/2 hour short exam)

Exam 2: In-class exam

Exam 3: Take-home exam

Final Exam: In-class exam, not comprehensive

A. Writing assignments: There are 4 writing assignments.

Goals of writing assignments:

Improve scientific writing skills
Improve communication skills
Improve critical thinking skills
Develop experimental design skills

GENERAL INSTRUCTIONS: Write a maximum double spaced page summary of an article to be discussed in class. The instructor will identify which article(s) to summarize. The summaries of the articles are to be written at a level appropriate for other scientists in the field. Use the information

included in 'How to Read a Scientific Paper' included in this packet to help you with these assignments.

First assignment: Pass/Fail (10 points); due Sept 3, based on papers discussed on Aug 27

Summarize the readings on the philosophy of science.

The goal of this exercise is to test your comprehension and to assess your ability to communicate clearly in writing. The format of the assignment is two pages (maximum), double spaced, Arial 11, 1 inch margins. Use your own words to identify and explain the major concepts presented in the articles by Platt and Feinman. Also include how the two articles relate to one another.

Second assignment: based on manuscript (50 points): Due Oct 3

Summarize one manuscript discussed in class (to be assigned by Dr. Teegarden).

Assignment should be turned in to secretary in Stone Hall G1 by 4 PM on Friday.

The goal of this assignment is to read and understand a manuscript and then summarize in writing. Understanding the manuscript and writing skills are emphasized. The format of the assignment is two pages (maximum), double spaced, Arial 12 pt type, 3/4 inch margins.

Third assignment: (60 points): Due Oct 24

Summarize and critique one manuscript discussed (to be assigned by Dr. Teegarden).

Assignment should be turned in to secretary in Stone Hall G1 by 4 PM on Friday

The goal of this assignment is to read and understand a manuscript and then summarize in writing. In addition, you must include a critical assessment of the work in the summary.

Understanding the manuscript, writing skills and critique are emphasized. The format of the assignment is two pages (maximum), double spaced, Arial 12 pt type, 3/4 inch margins.

Fourth assignment: (80 points): Due Nov 19

Summarize (review) and critique 2 manuscripts which will be discussed in class.

The goal of this assignment is to read and understand 2 manuscripts. Review both in writing and compare the results, including a critical assessment of the 2 manuscripts together.

Understanding the manuscripts, writing skills and critique are emphasized. The format of the assignment is three pages (maximum), double spaced, Arial 12 pt type, 3/4 inch margins.

Summaries will be graded on the criteria below:

Content of summaries:

1. All summaries should include:

Brief background and description paraphrasing the article which includes:

- Purpose for studies
- Hypothesis
- Experimental design and brief description of primary methods
This does not need to be a separate section and the extent of the information depends on the article. Methods can be included in the results to make a point
- Summarize important results
- Conclusions

Insightful or thoughtful comments will contribute to the grade

2. In addition, the second and third assignments should contain:

Critique which *may* include:

- Is the experimental design appropriate and does it test the hypothesis?
- Is the conclusion appropriate?
- How can these conclusions be applied?
- What are the limitations?

Technical points to consider:

- Write in complete sentences.
- Use topic (introduction) and conclusion sentences for each paragraph
- Every sentence should lead into the next sentence; avoid choppy statements.
- Every sentence at the end of a paragraph should lead to the introductory sentence of the next paragraph.
- Do not refer to tables, figures or materials that are not in your write-up. This is a stand-alone document.
- Define abbreviations the first time used such as: arachidonic acids (AA). Then you can use the abbreviations throughout.
- Conclusion/summary sentence or paragraph should be included at the end of the summary. This should state the overall implications of the research reviewed.

Avoid:

- Spelling or grammatical errors.
- Jargon (e.g. words that have a meaning in a scientific context that isn't obvious outside that context – “they ran a gel” rather than, “they conducted SDS-PAGE electrophoresis”)

Overall:

- Prepare a detailed outline to organize your ideas. Write from the outline.
- Tell a story. There should be a beginning, middle, and end that fit together and which engages the readers attention.
- Do not turn in your first draft. Great writing is not in the initial writing, it is in the RE-writing.
- Be concise. Simplify sentences-try to remove unnecessary words.

Common errors:

- Say what you mean.
- Keep the verb and appropriate subject noun close together in the sentence.
- Each sentence should have one subject and one verb.
- Remember who does the work. ‘The paper’ or ‘the study’ don’t do the work, the investigators do.

B. Participation:

You are required to participate in discussions of class material and research articles. While voluntary participation will be appreciated, instructors will call upon you for your answers/insights/opinions. Failure to actively participate will negatively influence your grade. The following guidelines will help you understand the level of participation that is required for each grade level:

- no participation = F
- participation only when called upon
 - response demonstrating a lack of understanding of the material = D
 - response provides only the minimum (correct) information = C
 - response provides insightful or thoughtful information = B
- voluntary participation
 - response provides minimum (correct) information = B
 - response provided insightful or thoughtful information = A

Discussions of articles:

The instructors will select all of the articles utilized in the course. The articles will be distributed to you in advance of the discussion period. You are expected to have read the article and be prepared to discuss the article in class. You will be called upon in class to answer questions if you do not participate on your own. Please review the attached sheet “How to read a paper for FN590B” in this packet for guidelines on how to prepare for these discussion.

C. Study Groups

Students will be assigned to study groups and will be expected to meet regularly to discuss class materials (i.e. not just before the exams). This will ensure that you are prepared to participate in classroom discussions. Midway in to the semester, the instructor will evaluate the study group participation, and the groups reassigned if needed.

Resource Material:

Required References:

Stipanuk, M.H. 2006, Biochemical and Physiological Aspects of Nutrition. 2nd edition, W.B. Saunders Co.

Lodish et al. 2008, Molecular Cell Biology, 6th edition, W.H. Freeman and Co.

General References Available on Reserve in the CFS Library:

Shils, M.E.; et al., 2005. Modern Nutrition in Health and Disease. 10th edition. Lippencott Williams and Wilkens.

Garrett, R.H. and Grisham, C.M., 1998, Biochemistry, 2nd edition, Harcourt Brace College Publishing.

Frayn K. 1996, Metabolic Regulation: A Human Perspective

How to Read Scientific Papers for FN 590B

(1) READ for general comprehension

- Start with the abstract (This is what the author has decided is important)
- Identify the methods used and what they are supposed to show. Do not get caught up in the details, especially on the first reading
- Read the results to help you understand the figures. Read the discussion to see what the author has to say about his or her data.

(2) SUMMARIZE (do this on a separate piece of paper)

- What is the research question/hypothesis?
- What are the major findings?
 - Look at the figures and tables, these often represent individual experiments. What purpose does each figure and table have? Does it test/answer a hypothesis/question that is being tested? What is the question? How does the figure/table relate to the question?
- How does the paper relate what you know?

(3) INTERESTING POINTS:

All papers have weak points, but many flawed papers raise interesting questions. Look for these interesting points in whatever you read.

(4) CRITICIZE:

- Was the hypothesis clearly stated?
- Were the methods appropriate? (knowing this usually comes from experience)
- Is the study well designed? (i.e. proper controls)
- Did the author make valid assumptions?
- Are the conclusions supported by the data?

(5) TAKE THE NEXT STEP

- Can you think of any potential research ideas after critically reading the paper?

HELPFUL SUGGESTIONS

(1) Don't wait until the last minute!!!!

(2) Make notes clearly on an index card or sheet of paper.

(3) Don't be afraid to ask someone for help.

FN605: Nutritional Biochemistry and Physiology 1

27-May-08

Two 2 hour sessions per week

<u>Mth</u>	<u>Date</u>	<u>Day</u>	<u>Instructor</u>	<u>Topic</u>
Aug	25	M	Teegarden/Fleet	Introduction/Scientific Method
	27	W	Fleet	Scientific Method/Gene expression
Sept	1	M	No Class, Labor Day	
	3	W	Fleet	Gene expression continued Writing Assignment 1 Due: summary of Scientific method discussion
	8	M	Fleet	Post-transcriptional events
	10	W	Fleet	EXAM 1 (30 min mini-test) Protein synthesis and trafficking
	15	M	Fleet	Protein degradation and protein turnover
	17	W	Fleet	Discussion: Protein Synthesis and Degradation
Optional extra session			Test review	
	22	M		EXAM 2
	24	W	Teegarden	Intestinal Cell Physiology: Anatomy and microanatomy Cell cycle
	29	M	Teegarden	Cell cycle continued
Oct	1	W	Teegarden	Discussion: cell cycle
	3	F		Writing Assignment 2 due, based on paper from Oct. 1 to secretary in Stone Hall Gi
	6	M	Fleet	Intestinal Cell Differentiation (integration of signaling concepts)
	8	W	Teegarden	Apoptosis
	13	M	No Class, Fall Break	
	15	W	Teegarden	Apoptosis/differentiation discussion
	20	M	Teegarden	Digestion: carbohydrates, lipids
	22	W	Teegarden	Digestion Discussion
	24	F		Writing assignment 3 due, based on paper from Oct. 22

	27	M	Teegarden	Nutrient Absorption/transport
	29	W		EXAM 3 <i>Take home exam available for pick up in G1 from 10:00 AM - 3 PM</i> <i>Return exam by 3PM</i>
Nov	31	F		
	3	M	Weaver	Mineral bioavailability and methods
	5	W	Fleet	Micronutrient introduction and enzymes Iron absorption/metabolism
	10	M	Fleet	Vitamin D metabolism and status
	12	W	Fleet	Vitamin D and bone/calcium homeostasis
	17	M	Weaver	Calcium function, distribution, metabolism and food sources
	19	W	Weaver	Discussion Writing assignment 4 due
	24	M	Weaver	Calcium requirements
	26	W	No class, Thanksgiving	
Dec	1	M	Boushey	Experimental design and methodology: dietary assessment methods
	3	W	Soyka	Renal physiology/acid-base balance
	8	M	Weaver	Discussion: Calcium and Vitamin D in health and disease
	10	W	Fleet	Nutrient Status Discussion
	Finals Week - Dec 15-20			Final Exam