SYLLABUS
Nutritional Biochemistry (NUTR 5625/ANSC 5625)

Instructor
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Office hours:  By appointment

Course Basics
Credits: 3
Time:
Location:
Prerequisite:  Biochemistry (undergraduate), Graduate student, or consent of instructor
Website:
Self-enrollment key:

Course Description
Nutritional Biochemistry covers biochemical molecules and metabolic pathways that are essential for nutritional homeostasis, with a focus on macronutrient metabolism. Targeted audiences of this course are graduate students in Nutrition, Animal Science, biochemistry, and other relevant programs.

Course Objectives
---To review the biological system of energy metabolism
---To study the chemical/biochemical properties and metabolic pathways of carbohydrates, lipids, and proteins.
---To examine the regulatory mechanisms of macronutrient metabolism and associated signaling pathways.
---To understand the research techniques used in basic biochemistry and nutritional biochemistry research.
---To evaluate and criticize the experimental approaches and scientific information presented in the research articles related to nutritional biochemistry.

Accommodations for Students with Disabilities
Participants with special needs are strongly encouraged to talk to the instructor as soon as possible to gain maximum access to course information. All discussions will remain confidential. University policy is to provide, on a flexible and individualized basis, reasonable accommodations to students who have documented disability conditions (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to
contact Disability Services and their instructors to discuss their individual needs for accommodations. Disability Services is located in Suite 180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612-626-1333 voice or TTY.

**Student Academic Integrity and Scholastic Dishonesty**

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else’s work as your own, can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

“Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.” Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course.

**Textbooks and Materials**

- Some of course contents originate from 3 textbooks below:
  
  
  

- Reading assignments and references will be posted in the Moodle site before the lecture. Handouts will be posted after the lecture.

**Teaching Expectations and Approaches**

This is an advanced course designed for graduate students majoring in nutrition (human and animal), biochemistry, and related disciplines. It is expected that the students should possess basic knowledge of biochemical and physiological processes in the body prior to attending this course. Up-to-date information on the regulation and dysregulation of macronutrient metabolism will be provided through presenting and discussing recent research papers in those areas. In order to understand the technical details and innovative approaches in the primary research, reading and reviewing research papers in nutritional biochemistry field are expected. The students will have opportunities to apply the knowledge learned from the classroom and literature research to criticize and discuss a recent research article in their term paper.
Method of Student Evaluation

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<tr>
<td>Exam I (Mid-term)</td>
<td>80</td>
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<tr>
<td>Exam II (Final)</td>
<td>75</td>
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<tr>
<td>Term paper (research article critique)</td>
<td>35</td>
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<tr>
<td>Homework</td>
<td>75 (3 times, 25+25+25)</td>
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<tr>
<td>Class presentation and participation</td>
<td>35</td>
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<tr>
<td>Attendance</td>
<td>90% attendance is required. More than 10% nonattendance will lead to grade deduction. (Sign-up sheet may be provided at the class)</td>
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The final course grade will be a letter grade.

A \[ \geq 93 \% \]  
A- \[ 90 - <93 \% \]  
B+ \[ 87 - <90 \% \]  
B  \[ 83 - <87 \% \]  
B- \[ 80 - <83 \% \]  
C+ \[ 77 - <80 \% \]  
C  \[ 73 - <77 \% \]  
C- \[ 70 - <73 \% \]  
D+ \[ 67 - <70 \% \]  
D  \[ 60 - <67 \% \]  
F  \[ <60 \% \]

- **University of Minnesota Grading Policy Statement:**
  A – Achievement that is outstanding relative to the level necessary to meet course requirements.
  B – Achievement that is significantly above the level necessary to meet course requirements.
  C – Achievement that meets the course requirements in every aspect.
  D – Achievement that is worthy of credit even though it fails to meet fully the course requirements.
  S – Achievement that is satisfactory, which is equivalent to a C- or better (achievement required for an S is at the discretion of the Instructor, but may be no lower than equivalent to a C-).
  F (or N) – Represents failure (or no credit) and signifies that the work was either: (1) completed but at a level of achievement that is not worthy of credit; or (2) was not completed, and there was no agreement between the instructor and the student that the student would be awarded an “I” (see also I).
  “I” – (Incomplete) Assigned at the discretion of the Instructor when, due to extraordinary circumstances (e.g., hospitalization), a student is prevented from completing the work of the course on time. It will require a written agreement between the instructor and student.

**Homeworks (75 points)**

**Purpose:** to consolidate the classroom learning and to prepare for the following paper discussion in each section of this course.
Format: A research paper related to the topics of ongoing lectures and a list of questions on the content of this research paper will be assigned one week before the scheduled paper discussion. The homework (1-2-page answers to assigned questions) will be due on the day of paper discussion.

Term paper on reviewing and criticizing a research paper (35 points)
Purpose: This practice aims to provide an experience on reviewing and critiquing a scientific report.

Format: maximum of 4 pages (excluding references); 12 pt font (Times New Roman); single spaced; page number at the bottom of each page; 1-inch margins on all sides.

A recent research article in the metabolism field will be assigned in October. The term paper can be roughly divided into 4 sections.

- **Overview** (7 points): to summarize the hypothesis, approaches, results and significance of a completed research project.
- **Technical issues** (at least one page, 10 points):
  ---to explain the technical details of research materials, such as special reagents or animal models, and methods, such as biochemical or genetic analysis (one or two small diagrams or figures can be used for this purpose)
  ---to discuss the reasons of using these materials and techniques as well as whether there are alternative techniques that can perform as good as or better than the ones described in the paper.
- **Strengths and weakness** (at least one page, 10 points): To identify the innovations and strengths of the study through a brief literature review and also point out the weaknesses of the study, such as writing style and structural organization of the paper; experimental design (sample size, sample collection, statistic methods, etc); data analysis (overinterpretation or misrepresentation, etc); inconsistency between the data and the conclusion; lack of explanation on the observations that are contradictory to other studies.
- **Perspectives** (8 points): Propose a study that can potentially advance the research topics described in this research paper.
  *Please include the references at the end of your term paper.

Class Presentation on the science behind the news (35 points)
Purpose: This assignment is designed to give students the opportunity to:
- Conduct a literature investigation on the scientific background of a nutrition-related news story or just an element of this news story
- Present the results of this investigation to the classmates
- Practice public speaking skills

Selected news story should be related to the contents of this course so the classmates could use their knowledge to understand and analyze the scientific merit of the story.

Format:
• ~15-minute Powerpoint presentation (around 15 slides) and ~5-minute Q and A
• The slides should be presented in a logical sequence.
  ---First 1 or 2 slides to introduce your story and explain why it is newsworthy.
  ---In the following slides, present the scientific background of this story in mechanistic level
    (such as gene, enzyme, metabolites...)
  ---Discuss the issues with this story (such as contradictory reports and research...)
  ---Propose experiments and studies to further examine the story if possible.
• Use the data from research articles to support or disapprove the claims in the news story
• The presentation will be evaluated by fellow classmates (60%) and instructor (40%).

**SELECTED TITLES OF CLASS PRESENTATIONS IN 2011 AND 2012**
---“Carbo-loading” before long-distance running
---Overeating and lipolysis
---UCP2 and diabetes
---Raspberry ketone and weight loss
---Cyclopropene FA and dietary lipids
---PGC1a and transformation of white fat
---Rumen fermentation and green gas emission
---Ketogenic diet and weight loss
---ABCA1 and lipid-dependent drug sensitivity
---Dietary intervention in pregnancy
---Old fat, new fat
---Alcohol and amino acid deficiency
---Arginine and peripheral artery disease

**Exams (Mid-term: 80 points, Final: 75 points)**
**Format:**
• Multiple-choice questions
• True-or-false questions
• Short essay questions
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