

HUN 4813C
Laboratory Techniques in Molecular Nutrition
Spring 2025 – Section 028B (12190)

Instructor: Zhiyong Cheng, PhD
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Office hours Mondays (2:00-3:00 pm) by appointment; FSHN - Room 265

Class location and meeting times: T: Periods 2-4 (8:30 am – 11:30 am), FSN 0310
R: Periods 2-3 (8:30 am – 10:25 am), MAEB 0238

Attendance: Required
Credits: 3

Course Description and Prerequisites: The course focuses on laboratory techniques that are used to study nutrition on a molecular level. The class will cover the knowledge of nutrition, biochemistry, molecular biology, genomics, physiology, and bioinformatics. Students will be engaged in (1) watching video demos and discussing the principles of lab techniques, (2) developing protocols and shooting troubles, (3) examining and interpreting published research, and (4) applying lab techniques and addressing real-life research questions.

Prerequisites: CHM 2211, CHM 2211L, BCH 3025 or BCH 4024

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

1. Explain the principles of laboratory techniques for molecular nutrition research.
2. Choose research methods effectively to accomplish research goals.
3. Design and plan feasible projects to address real-life questions.
4. Interpret and conclude about experimental data with inference.
5. Examine and critique published research.

This course uses the e-Learning (Canvas) system to post class materials. 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.

Recommended Text: No required textbook for this course. Class materials will be posted at Canvas. Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor. The instructor is only responsible for these instructional materials.

Class/Laboratory 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 shown above).

Student Evaluation: The assessments comprise of 6 quizzes (25 points each), 9 lab protocols & reports (10 points each), 8 research reflections (8 points each), a project report – writing (40 points), a project presentation - oral (30 points), and class participation (26 points). All assessments are administered via canvas, where the instructions and grading rubrics will be posted. Quizzes are closed book, in person (sign in/out required), timed (25 min), and administered on Canvas. Each quiz will consist of 8 ‘choose an answer among multiple choices’ questions and 2 short-answer questions. Class participation is higher valued and will be graded according to the rubric (see next page).

Assignments and quizzes must be submitted at due time as scheduled. One reflection may be dropped with no penalty. No makeup for missed assignments or quizzes unless there are 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. Any missed assignment or quiz will result in a grade of “0”. An excused/documented absence from a quiz (or lab assignment) will result in the grade for the missed quiz (or lab assignment) being calculated as the average of other quizzes (or lab assignments).

Grade Breakdown	Points
Quizzes (25 pts x 6)	150
Lab protocols & report (10 pts x 9)	90
Reflections (8 pts x 8)	64
Project presentation – oral (30 pts)	30
Project report – writing (40 pts)	40
Class participation (26 pts)	26
Total	400

Grading scale (Grades are not curved or negotiable; final grade in % other than arbitrary points)

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

Instructor-Initiated Recording of Class: 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.

Attendance and Participation Rubric

Criteria	Unsatisfactory-Beginning	Satisfactory-Developing	Excellent-Accomplished	Total
Attendance*	3 points	5 points	8 points	/8
2 absences are allowed with no questions asked/no penalty. Absences beyond 2 should receive prior approval(s).	6+ absences (unexcused)	3-5 absences (unexcused)	Besides the 2 penalty-free absences, attended all class sessions or received approval for necessary absences	
Frequency	2 points	4 points	6 points	/6
	Student does not initiate contribution & does not participate without prompting from the instructor.	Student sometimes initiates contribution, but does so infrequently (fewer than half of the class sessions)	Student initiates contribution in at least half of the class sessions	
Quality *	2 points	4 points	6 points	/6
For the quality of class participation, a functional camera and audio with minimal background noise are expected.	Comments are uninformative and lacking in appropriate terminology. Heavy reliance on opinion and personal taste.	Comments are sometimes constructive, but not always relevant to the discussion. Student sometimes uses appropriate terminology.	Comments are mostly insightful & constructive; student mostly uses appropriate terminology.	
Listening	2 points	4 points	6 points	/6
	Does not listen to others; regularly talks while others speak or does not pay attention while others speak; detracts from discussion; sleeps, etc.	Student is mostly attentive when others present materials and perspectives, but sometimes needs to be reminded of the class focus.	Student listens attentively when others present materials and perspectives, as indicated by comments that build on others' remarks, i.e., student hears what others say & contributes to the dialogue.	
				/26

Adapted from Carnegie Mellon

In-class Recording by Students: Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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.

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/process/student-conduct-honor-code>.

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.

Use of artificial intelligence (AI) tools: Note that the accuracy and credibility of information from AI-based platforms have been questioned. If students use AI tools to prepare their assignments, it is the students' responsibility to ensure the information credibility, acknowledge the AI assistance and sources, and abide by the UF Honor Code. AI tools are not allowed for closed-book quizzes or exams.

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.

Course Evaluation: Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. 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: <https://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 <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

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/

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.

Whole Gator app: <https://studentlife.ufl.edu/wholegator/>

University Counseling & Wellness Center: Counseling Services, Groups and Workshops, Outreach and Consultation, Self-Help Library, Wellness Coaching. 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/

U Matter We Care: If you or someone you know is in distress, please contact us at 352-392-1575 or visit umatter@ufl.edu to refer or report a concern and a team member will reach out to the student in distress.

Career Connections Center: First Floor JWRU, 352-392-1601, <https://career.ufl.edu/>

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

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need or visit www.shcc.ufl.edu/.

University Police Department: Call 352-392-1111 (or 9-1-1 for emergencies) or visit www.police.ufl.edu/.

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; www.ufhealth.org/emergency-room-trauma-center.

Field and Fork Food Pantry located behind the FSHN Bldg (520 Newell Dr) is available to assist members of the campus community who experience food insecurity.

Student Success Initiative <http://studentsuccess.ufl.edu>

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 so that the U Matter, We Care Team can reach out to the student in distress. Nighttime and weekend crisis counselors are 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.

Topics and Schedule: (subject to change)

Classes/Dates	Topics	Notes
1 (1/14, T)	<ul style="list-style-type: none"> • Class overview • Identifying your # 1 research questions 	<ul style="list-style-type: none"> • Reflection 1
2 (1/16, R)	<ul style="list-style-type: none"> • Research compliance <ul style="list-style-type: none"> ✓ IRB (Institutional Review Board) ✓ IACUC (Institutional Animal Care and Use Committee) ✓ IBC (Institutional Biosafety Committee) <ul style="list-style-type: none"> ➢ Working with a fume hood/biosafety cabinet ➢ Preserving biological samples at low temperature 	<ul style="list-style-type: none"> • Reflection 2
3 (1/21, T)	<ul style="list-style-type: none"> • Key factors to consider for project design <ul style="list-style-type: none"> ✓ Study design ✓ Sample size ✓ Sampling bias ✓ Variable control • How to build a strong project (instructions and tips) 	
4 (1/23, R)	<ul style="list-style-type: none"> • General lab techniques <ul style="list-style-type: none"> ✓ Sample transfer and handling <ul style="list-style-type: none"> ➢ Pipetting with micropipettor ➢ Pipetting with serological pipettors ✓ Sample preparation with centrifuges 	<ul style="list-style-type: none"> • Protocol 1 • Announce proposal outline meetings
5 (1/28, T)	<ul style="list-style-type: none"> • Overview of commonly measured parameters <ul style="list-style-type: none"> ✓ Nutrients and metabolites ✓ Gene expression and variants ✓ Proteins (enzymes, transporters, signal molecules) <ul style="list-style-type: none"> ➢ Hormones and signaling pathways 	<ul style="list-style-type: none"> • Reflection 3
6 (1/30, R)	<ul style="list-style-type: none"> • Fasting/feeding physiology <ul style="list-style-type: none"> ✓ Spotlight on Glucose (or cholesterol) • Research proposal outline – 1 on 1 group meeting 	<ul style="list-style-type: none"> • Protocol 2 • FSN 227
7 (2/4, T)	<ul style="list-style-type: none"> • Protein analysis – principles (I) <ul style="list-style-type: none"> ✓ Spectrophotometry (total protein analysis) ✓ Mass spectrometry (m/z) • Proteomics 	<ul style="list-style-type: none"> • Quiz 1
8 (2/6, R)	<ul style="list-style-type: none"> • Protein analysis – lab section (I) <ul style="list-style-type: none"> ✓ Spectrophotometry (total protein) 	<ul style="list-style-type: none"> • Protocol 3 • Post-lab commenting for 1 xpt

9 (2/11, T)	<ul style="list-style-type: none"> • Protein analysis – principles (II) <ul style="list-style-type: none"> ✓ WB ✓ IHC 	<ul style="list-style-type: none"> • Reflection 4
10 (2/13, R)	<ul style="list-style-type: none"> • Protein analysis - lab section (II) <ul style="list-style-type: none"> ✓ SDS-PAGE 	<ul style="list-style-type: none"> • Protocol 4 • Post-lab commenting for 1 xpt
11 (2/18, T)	<ul style="list-style-type: none"> • Protein analysis – principles (III) <ul style="list-style-type: none"> ✓ IP • ChIP and ChIPseq 	<ul style="list-style-type: none"> • Quiz 2
12 (2/20, R)	<ul style="list-style-type: none"> • Protein analysis - lab section (III) <ul style="list-style-type: none"> ✓ Protein transfer 	<ul style="list-style-type: none"> • Protocol 5 • Post-lab commenting for 1 xpt
13 (2/25, T)	<ul style="list-style-type: none"> • Protein analysis – principles (IV) <ul style="list-style-type: none"> ✓ ELISA and Protein array 	<ul style="list-style-type: none"> • Reflection 5
14 (2/27, R)	<ul style="list-style-type: none"> • Protein analysis - lab section (IV) <ul style="list-style-type: none"> ✓ Immunoblotting and imaging 	<ul style="list-style-type: none"> • Protocol 6 • Project checkup
15 (3/4, T)	<ul style="list-style-type: none"> • Gene analysis - principles (I) <ul style="list-style-type: none"> ✓ Spectrophotometry (total DNA, RNA) ✓ PCR (specific gene expression) 	<ul style="list-style-type: none"> • Reflection 6
16 (3/6, R)	<ul style="list-style-type: none"> • Gene analysis - lab section (I) <ul style="list-style-type: none"> ✓ DNA/RNA QC 	<ul style="list-style-type: none"> • Quiz 3 • Protocol 7a
17 (3/11, T)	<ul style="list-style-type: none"> • Gene analysis - principles (II) <ul style="list-style-type: none"> ✓ DNA/RNA Microarray ✓ Sequencing techniques <ul style="list-style-type: none"> ➤ Sanger Sequencing ✓ NGS 	<ul style="list-style-type: none"> • Reflection 7
18 (3/13, R)	<ul style="list-style-type: none"> • Gene analysis - lab section (II) • Fasting/feeding genes via PCR 	<ul style="list-style-type: none"> • Protocol 7b • Post-lab commenting for 1 xpt
19 (3/18, T)	<ul style="list-style-type: none"> • No class (Spring Break) 	
20 (3/20, R)	<ul style="list-style-type: none"> • No class (Spring Break) 	
21 (3/25, T)	<ul style="list-style-type: none"> • Hormone analysis - principles <ul style="list-style-type: none"> ✓ Nutrients and hormonal signaling ✓ Hormone and functional analysis <ul style="list-style-type: none"> ➤ Gene analysis (e.g., PCR) ✓ Pathway analysis (e.g., ELISA, WB, IHC/ICC) ✓ Small molecule hormones <ul style="list-style-type: none"> ➤ Hormone level ✓ LC/MS or GC/MS 	<ul style="list-style-type: none"> • Quiz 4

22 (3/27, R)	<ul style="list-style-type: none"> Hormone analysis – lab section <ul style="list-style-type: none"> ➤ Fasting/feeding insulin by ELISA 	<ul style="list-style-type: none"> Protocol 8 Project checkup
23 (4/1, T)	<ul style="list-style-type: none"> Nutrient and metabolite analysis - principles <ul style="list-style-type: none"> ✓ PCR ✓ WB, ELISA ✓ Spectrophotometry/spectrometry ✓ Metabolomics (MS, NMR, etc.) 	<ul style="list-style-type: none"> Quiz 5 Announce proposal-layout meetings
24 (4/3, R)	<ul style="list-style-type: none"> Nutrient and metabolite analysis – lab section Fasting/feeding – ketone body 	<ul style="list-style-type: none"> Protocol 9 FSN 227
25 (4/8, T)	<ul style="list-style-type: none"> Research proposal layout - 1 on 1 meetings 	<ul style="list-style-type: none"> Pick the dates of presentation
26 (4/10, R)	<ul style="list-style-type: none"> No class - work on your project finalization 	
27 (4/15, T)	<ul style="list-style-type: none"> Research Proposal – Oral presentation (I) 	
28 (4/17, R)	<ul style="list-style-type: none"> Research Proposal – Oral presentation (II) 	
29 (4/22, T)	<ul style="list-style-type: none"> Omics approaches and personalized nutrition <ul style="list-style-type: none"> ✓ Personalized nutrition ✓ Omics in personalized nutrition Ongoing clinical trials of personalized nutrition 	<ul style="list-style-type: none"> Quiz 6 Reflection 8
30 (4/24, R)	<ul style="list-style-type: none"> Reading Day 	
31 (4/29, T)	<ul style="list-style-type: none"> Exam week (No Class Meeting) 	<ul style="list-style-type: none"> Final paper due
32 (5/1, R)	<ul style="list-style-type: none"> Exam week (No Class Meeting) 	<ul style="list-style-type: none"> Reflection 8 due