

MCB4422: Probiotics (3 credits)
Spring 2026

MCB4422 is an upper division course on probiotics. This course will cover the use of microorganisms to promote a health status in the animal and human host. This course will provide a conceptual background in microbiology and immunology for the use of microorganisms for the prevention or treatment of animal and human diseases.

Student Learning Outcomes – After successful completion of this course, students will be able to:

1. Define the terms probiotic and live biotherapeutic product (LBP)
2. Compare and contrast the use of lactic acid bacteria, *Bifidobacterium* and *Propionibacterium* as probiotics
3. Describe the range of proposed probiotics and the challenges in ensuring their safety and efficacy
4. Compare and contrast the mechanisms used by probiotic microorganisms to modulate the host immune responses in the animal and in the human host
5. List the proposed uses of probiotic microorganisms for the prevention or treatment of animal and human diseases
6. Compare and contrast the applications of prebiotics, probiotics, LBP, postbiotics and symbiotics
7. Discuss current research efforts and proposed applications of probiotics for animal and human health

Lectures: Online through Canvas. If you are new to Canvas, watch a short [Canvas Overview](#) video. Be sure to disable your pop-up blocker to avoid the blocking of content in Canvas.

Instructor: Dr. Graciela L Lorca

Office: Genetics Institute, Room 307

WebPage: Canvas (<https://ufl.instructure.com/>). Please select MCB4422

Online help with classroom technology: <https://it.ufl.edu/helpdesk/>

Pre-requisite: MCB3020 or MCB3023

Communication: for questions regarding class and textbook content use the Course questions forum, for issues on Homework Assignments, class organization check first the

syllabus, the announcements and calendar on Canvas, then post your questions on the discussion forum. For all other issues contact Dr. Graciela Lorca.

Office hours: Live Wednesdays 5 PM through ZOOM Conferences or by appointment: (only if you cannot make it to office hours) send an e-mail with three suggested times and I will choose one for us to meet.

VIRTUAL OFFICE HOURS: will be available every week through the **ZOOM tool in Canvas**. To participate go to ZOOM Conferences in the left of your screen and join! You will receive a weekly reminder by email.

Contact Information: Use emails through Canvas ONLY (personal emails should only be used in a case of real emergency)

Dr. Graciela L Lorca:

Email (the most efficient): ONLY use Canvas e-mail (If you do not have access to the e-learning platform and need to contact me for an **emergency**, use glorca@ufl.edu)

Phone: 273 8090 (please leave a message).

- **Course questions forum:** It is available in Canvas. It is very useful, please post and see answers on questions on class content and organization. Postings and answers are monitored by the instructor to make sure no mistakes get propagated.

Minimum technology requirements. The student will require access to a working computer with reliable and stable internet connection and a webcam. Exams are delivered using Honorlock that requires Honorlock Chrome extension ([Honorlock Student Instructions](#)).

Technical skills and digital information literacy skills requirements. Technical skills requirements include: using the online Canvas learning management system ([Canvas Overview](#) video); using email with attachments; creating and submitting files in commonly used word processing program formats; using presentation and graphics programs; and using web conferencing tools and software (Zoom).

Digital information literacy skills requirements include using online libraries and databases to locate and gather appropriate information; using online search tools for specific academic purposes, including the ability to use search criteria, keywords, and filters; properly citing information sources; preparing a presentation of research findings

Material

- **Textbook:** A textbook is not required. All the material covered is provided in each module. It is important that you familiarize yourself with how to use the VPN to ensure

you have ease of access to some of the reading material. Learn more about [how to use UF's Gatorlink VPN Service](#)

- **Suggested readings:** For each module, suggested readings will be posted as links to download them from PUBMED. Remember to connect to UF through VPN (if outside campus) before accessing the journals.

Assessment of learning

Activities (286 points): Activities will be assigned by Unit.

- **Assignments 1 and 2 (40 points each).** These assignments include online research on diverse topics such as “Introducing my favorite putative probiotic microorganism”, and “Market claims: is there scientific evidence?”. These activities are mandatory and count towards the final grade. **They should be completed by the deadline indicated on Canvas. LATE SUBMISSION POLICY:** a 5% deduction will be applied per day that the assignment is late.
- **Weekly activities (16 points each).** Examples of these activities are: “Introduce yourself”, “My perception of the probiotic concept”, “glossary” and “Main concepts that I should know”. The goal of these assignments is that the student keeps up with reading of the material on weekly basis. To achieve this goal, you are required to design questions that will assess the main concepts of the modules indicated. The activities are mandatory and count towards the final grade. **They should be completed by the deadline indicated on Canvas. LATE SUBMISSION POLICY:** a 5% deduction will be applied per day that the assignment is late.
- **Extra-credit Assignment (30 points).** The purpose of this quiz is to provide additional credit opportunities by reading a paper on emerging technology on microbiota manipulation and demonstrating your understanding of its content. **This activity is optional** but must be completed by the deadline indicated in Canvas. Instructions on how it counts towards the final grade can be found on the grading scale section.
- **Mid-terms (714 points):** Exams will assess your knowledge of the concepts covered during the lectures. It requires Honorlock Chrome extension. The assessment will be performed in **Three Mandatory Mid-term exams**. The student will be given the option to take a final cumulative exam at the end of the course that can be used to improve the grade obtained through the mid-term exams.
 - *Mid-terms (714 points):* There will be three 50 minutes proctored mid-term exams (238 points each) with multiple choice questions. **All exams are mandatory and will count towards the final grade.** Exams will test learning and understanding of material presented in lectures.
 - *Optional Final to replace ONE midterm test (with the lowest grade) will be available during Finals Week.* The students **MUST** have taken all three tests to qualify for

the Optional Final. This cumulative test will include all the content included in Units 1 to 5 and will be worth 238 points.

Make-Up policy: Make-up exams will ONLY be allowed with a VALID justification. If one exam is missed, it will result in a score of 0 for the test (see below for “Excused absences”).

Excused absences:

Documentation MUST be provided for absences caused by serious illness, accident, jury duty, or death in the immediate family. You must contact the instructor **as soon as possible** of the missed exam and I will arrange an alternative time for the exam.

After the exam: The grades will be available on Canvas three days after the exam, unless notified by an announcement. Test questions will be made available through personal meetings. After the scores release the student will have **two weeks** to submit questions about the test or claim mistakes in grading. No claims will be considered after that time.

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Grades and Grade Points

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Grades availability: Grades for assignments and quizzes with multiple choice format will be released within 48h of the deadline. For narrative-based essays, I will grade as efficiently as I can but since this is a large course, feedback and grades will be available within 2-weeks of the deadline.

Final Grades: Straight scale. **Total points= 1000** (Not including extra-credits)

Grading Scale

Grade	Total points	Percentage
A	900 or above	90% or above
A-	860-899	86.0-89.9%
B+	830-859	83.0-85.9%
B	790-829	79.0-82.9%
B-	750-789	75.0-78.9%
C+	720-749	72.0-74.9%
C	690-719	69.0-71.9%
C-	660-689	66.0-68.9%
D+	630-659	63.0-65.9%
D	600-629	60.0-62.9%

D-	570-599	57.0-59.9%
E	560 or below	56.0% or below

How do I calculate my grade with extra-credits?

Canvas cannot handle extra-credits points for the automatic calculation of the final grade. As a result, you may notice that the grade obtained is calculated as part of the total points in the final grade. To alleviate this confusion, I will activate a column in the gradebook named “Total points earned” that the students can use to calculate their final grade using the grading scale shown above.

Note: The instructor manually enters grades so there is no risk on the incorrect grade being transferred into OneUF.

Unit	Module. Topic
Unit 1	Probiotics: definitions, history and classification - Definitions and History - Classification and physiology: <i>Lactobacillus</i> and other lactic acid bacteria (LAB) - Classification and physiology: <i>Bifidobacterium</i> and <i>Propionibacterium</i> - Classification and physiology: Next generation probiotic species - Impact of genomics on the characterization of probiotic strains
Unit 2	Biotechnological applications of Lactic acid bacteria - The uses of LAB in food fermentation - Antimicrobials produced by LAB - Bioactive molecules and high value metabolites produced by LABs Assignment 1 due Midterm 1 (M1-M8)
Unit 3	Interactions of probiotics with the host immune system - Overview on the innate and adaptive immune responses - Immunomodulatory properties of probiotics - Engineering probiotics for the delivery of health-associated molecules
Unit 4	Probiotics safety and efficacy - Guidelines and safety considerations on probiotics and live biotherapeutic products (LBPs) - Factors influencing the efficacy of probiotics Midterm 2 (M9-M13) - Efficacy of probiotics in human subjects - Probiotics in animal husbandry and health Assignment 2 due
Unit 5	New frontiers in the probiotic's field The Microbiota and probiotics

17. Prebiotics, synbiotic and postbiotics
18. Consortia transplants and other emergent technology
Midterm 3 (M14-M18)
Optional Final (U1-U5)

Important DeadlinesPreliminary**.** The MOST current due dates are listed on Canvas.

Task	Due Date
Midterm 1	02/16/2026
Midterm 2	03/09/2026
Midterm 3	04/20/2026
Optional cumulative final	04/28/2026
Assignment 1	02/09/2026
Assignment 2	03/30/2026

University of Florida Policies

University of Florida Policies Grades and Grade Points

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Attendance and Make-Up Work

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Services for Students with Disabilities

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

Campus Helping 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

(<https://umatter.ufl.edu/>) 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 (<https://counseling.ufl.edu/>) 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 (<https://shcc.ufl.edu/>).
- University Police Department: Visit UF Police Department website (<https://police.ufl.edu/>) 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 (<https://ufhealth.org/emergency-room-trauma-center>).
- GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website (<https://gatorwell.ufsa.ufl.edu/>) 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 <https://it.ufl.edu/helpdesk/>.
 - Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services (<https://career.ufl.edu/>).
 - Library Support: Various ways to receive assistance with respect to using the libraries or finding resources (<https://uflib.ufl.edu/>).
 - Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring (<https://teachingcenter.ufl.edu/>).
 - Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers (<https://writing.ufl.edu/writing-studio/>).
 - Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information (<https://sccr.dso.ufl.edu/policies/student-honor-%20code-student-conduct-code/>).
- On-Line Students Complaints: View the Distance Learning Student Complaint Process (<https://distance.ufl.edu/state-authorization-status/#student-complaint>).

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 <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/> .

Class demeanor

Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

Netiquette guide for online courses

It is important to recognize that the online classroom is in fact a classroom, and certain behaviors are expected when you communicate with both your peers and your instructors. These guidelines for online behavior and interaction are known as netiquette.

https://cise.ufl.edu/wp-content/uploads/sites/15/2019/08/CISE_Netiquette_Guide.pdf

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: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>

Additional comments regarding academic integrity:

Students are encouraged to discuss material with each other from the course, help each other understand concepts, study together, and even discuss assessment questions with each other once the quiz window is closed. However, the following is considered academic dishonesty, and I expect that no student will ever do any of the following:

- Have another person complete a quiz in this course
- Copy another student's quiz in this course
- Collaborate with anyone during a quiz in this course
- Discuss the questions and answers of a quiz with other students while the quiz window is still open
- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).
- Use any materials provided by a previous student in the course

Use of Artificial Intelligence In academic work

AI-powered tools, such as language generators and citation managers, may be useful for creating outlines for literature reviews. However, AI should be used as a supplement to, not a replacement for, human critical thinking and analysis. ***Make sure you always cite and acknowledge AI-generated content properly.***

Prohibited Use Cases:

- Using AI to complete assignments or projects without human critical analysis.
- Relying solely on AI-generated content for research or analysis.
- Presenting AI-generated content as original work without proper citation.

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.

Microsoft Office 365 Software is free for UF students: <http://www.it.ufl.edu/gatorcloud/free-office-365-downloads/>

Other free software is available at: <http://www.software.ufl.edu/>

Canvas learning management system: [Canvas Overview](#) video

Honorlock: [Honorlock Student Instructions](#)

VPN to access to some of the reading material: [how to use UF's Gatorlink VPN Service](#)

To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357) or <https://it.ufl.edu/helpdesk/>

University of Florida Complaints Policy and Student Complaint Process

Most problems, questions and concerns about the course will be resolved by professionally communicating with the instructors.

The University of Florida believes strongly in the ability of students to express concerns regarding their experiences at the University. The University encourages its students who wish to file a written complaint to submit that complaint directly to the department that manages that policy.

If a problem really cannot be resolved by communicating with the instructor or the TAs you can contact

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

This said, professionalism is a two-way-street. Unprofessional behavior of students includes, among other things: lack of communication, blaming other people or external factors, lying,

affecting others negatively in a group or in the class, not accepting criticism and not being proactive in solving problems or seeking help. Furthermore, faculty often have family and other obligations to tend to. Over the weekend, replies to your inquiries or questions maybe delayed.

If a student is lacking professionalism repeatedly, the instructor has the rights to file formal complaint against the student through the Dean of Student office.