

# **COURSE SYLLABUS FOR MCB 4034L: “Advanced Microbiology Lab”**

## **1 credit**

**Fall semester 2024: Thursday August 22 – Tuesday October 15**

### **1. COURSE MEETING TIMES AND LOCATION:**

Labs will be held in the Microbiology and Cell Science Bldg. on Tuesdays and Thursdays as follows:

Class number 14168: Periods 3-5 (9:35 pm – 12:35 am) -- room 1030

Class number 14366: Periods 7-9 (1:55 pm – 4:55 pm) -- room 1030

All labs will be held in person, in the above room of the Microbiology and Cell Science Building, according to the course schedule. The final exam may be held in a different room, to be announced. The instructor reserves the right to change the schedule as deemed necessary to complete the objectives of the course and will inform the students of this via e-learning and/or lectures. A detailed schedule of activities is available on the last page of this syllabus.

### **2. COURSE DESCRIPTION**

Application of microbial, molecular biological and immunological techniques to the expression, isolation, identification and characterization of recombinant proteins produced in bacteria. The approaches are relevant in both basic (biomedical) research and industrial production of proteins and are intended to prepare the students for graduate school, professional careers in microbiology, as well as (temporary) employment as research assistants in basic research labs. Mastery of the skills and knowledge covered in the course will increase the likelihood of being hired and of performing well in the job. This is confirmed every semester by thank-you messages from former students. The course material is also helpful in preparation for MCAT and medical school.

### **3. PRE-REQUISITES:**

MCB 3020L or MCB 3023L with a grade of C or better.

MCB 4203, MCB 4304, PCB 4522 or PCB 5235 recommended

### **4. CONTACT INFORMATION:**

Instructor: Dr. Wilfred Vermerris

Email: [wev@ufl.edu](mailto:wev@ufl.edu)

Graduate TA: Lorena Oña Yanez [l.onayanez@ufl.edu](mailto:l.onayanez@ufl.edu)

Undergraduate TA's for morning section: Brooke Astley [brookeastley@ufl.edu](mailto:brookeastley@ufl.edu)  
Mason Bui [masonbui@ufl.edu](mailto:masonbui@ufl.edu)

Undergraduate TA's for afternoon section: Melissa Erdem [merdem@ufl.edu](mailto:merdem@ufl.edu)

The instructor and TA's will be available at the beginning and end of each class to answer questions. The TA's can provide further assistance/clarification related to course material outside class hours via email. Responses will typically be sent within 4 hours after receipt (during business hours). Please contact the graduate TA and/or instructor for questions related to attendance or special accommodations. Individual in-person or Zoom appointments can be scheduled if needed. Professional interactions with the instructor and TA's are expected at all times.

### **5. COURSE OBJECTIVES:**

Upon completion of this course, students will:

1. Understand the theory, advantages and limitations of several advanced microbiology and molecular biology techniques (i.e. isolation of DNA and proteins, manipulation of DNA, Sanger sequencing, western blotting) that are commonly used in life sciences research labs in academia, government and industry.
2. Be able to perform data analysis using a variety of software and web-based resources, interpret experimental results and troubleshoot failed experiments
3. Be able to correctly perform relevant calculations necessary to ensure successful outcomes of the experiments
4. Understand how these techniques are applied for the production of recombinant proteins in industrial microbiology and basic research

## 6. REQUIRED TEXTBOOK/ SOFTWARE/ COMPUTER

No textbook is required. All course materials, including background reading materials, lecture notes, on-line assignments, quizzes, and other tools for this course will be available through the Canvas Learning Support System homepage [<http://elearning.ufl.edu/>]. In addition, a student version of the SnapGene software package (<http://www.snapgene.com>; GSL Biotech, LLC) may be required. Details for how to obtain a copy of this software will be provided in class. The software may only be installed on one computer per student and will expire at the end of the course. To review the privacy policy of Canvas, please visit <https://www.instructure.com/policies/privacy>. For details on the accessibility of Canvas, please visit <https://www.instructure.com/canvas/accessibility>. You will need to enter your Gatorlink username and password to access the system. If you do not have an active GatorLink ID, cannot remember your GatorLink login information, or if your ID does not work, please refer to the GatorLink website [<http://gatorlink.ufl.edu>] or to the UF Computing Help Desk (The Hub, 392-HELP) for assistance.

You will need to bring a WiFi-enabled computer or tablet to class in order to submit answers to exams and quizzes. The computer can also be used to take notes.

## 7. LAB FEES, PROTECTIVE EQUIPMENT AND DISTRACTIONS

The department assesses a lab fee for this course that covers the cost of the materials we use, including enzymes, gels, pipette tips, tubes, culture medium, petri dishes, DNA isolation kits, antibodies, membranes and various chemicals.

Students are **required** to wear a **lab coat** during class. This reflects good standard laboratory practice for general safety and to prevent contamination during lab exercises. The lab coat (available in different sizes) will be provided on the first day of class and must be labeled with the student's name on the chest pocket. The lab coat needs to be buttoned to provide maximal protection and prevent items from getting knocked off the benches. The lab coat can be stored in the lockers located in the hallway. The lockers can also be used during class to store food, drinks and personal belongings. In addition, **disposable gloves**, **safety goggles** and other personal protective equipment will be provided as needed. Please dress appropriately in consideration of the lab activity (i.e. use of stains, microbial cultures). For safety reasons, all students are required to wear **closed-toed shoes** in the lab. Failure to comply with the requirement to wear protective equipment will result in dismissal for that particular day and a 25-point penalty. You may bring your own N95 facemask or use a mask provided by the department if you like.

The use of messaging and streaming apps and social media, on cell phones, tablets or computers is **prohibited** during instruction and experimental procedures. The reason for this policy is that these activities represent a major distraction that can (1) impede learning, (2) result in failed experiments due to missing important instructions from the instructor or TA, and (3) delay a timely response to a hazardous situation, thereby creating a safety risk for the distracted party and those around them. Messages and email can be checked during designated breaks.

## 8. ATTENDANCE POLICY

This is a fast-paced course where each session relies on information from the previous session. Attendance and participation in all lab periods are mandatory, and attendance at each session will be recorded. Sessions start promptly at the beginning of period 3 (morning section) or period 7 (afternoon section), and late arrivals (>10 min) will count as absence. It is important to prevent conflicts with other activities during class times. It is, however, understood that this cannot always be avoided. Each student is allowed one absence to take care of personal or professional matters (religious observance, illness, UF-sponsored event, funeral, interview for graduate/medical/dental/vet/pharmacy school, conference, etc.). Additional absences will only be excused if they are due to a religious observance, UF-sponsored event, illness, or bereavement (documentation/proof for the latter three categories will be required). Biochemistry exams scheduled during regular lab times do not count as an excused absence. For each unexcused absence beyond the one missed class, 25 points will be deducted from the overall point total at the end of the semester. Students who miss a lab will need to let their partner know of their absence and will be responsible for learning any missed course material (lectures, assignments) for the midterm quiz and final exam, whether an absence is excused, unexcused, or unexpected. It is recommended that you communicate with the graduate TA and instructor as soon as you are aware of a pending conflict or situation that will compromise your ability to attend class.

## 9. "MAKE-UP" EXAMS

The administration of make-up exams is at the discretion of the instructor and will be assessed on a case-by-case basis.

## 10. HOW TO DO WELL IN MCB4034L

This course is called 'Advanced' for a reason and requires the students to come to class prepared in order for the

background material discussed in class to make sense, and for each lab session to end on time (this is important because of other lab courses scheduled in the same room afterwards). This will require students to budget time outside scheduled class hours to review, practice and complete assignments. Planning, design of experimental procedures and trouble-shooting are an integral part of the class, and will require mastery of the basic principles underlying the course material. Students who obtained a grade of C or lower in past semesters tended to not keep up with the course material, performed poorly on quizzes, did not review mistakes on quizzes prior to the exams, did not ask for help when they needed it, and did not take appropriate action after a weak performance on the mid-term exam.

## 11. GRADES

The grading scheme for this course is as follows:

Quizzes (8 @ 25 points each)	200 points (the best 8 out of 9 will be counted; see below)
Mid-term exam	240 points
Online assignments (50; 75; 75; 120 points)	320 points
<u>Final Exam</u>	<u>240 points</u>
TOTAL	1,000 points

Final letter grades will be assigned based on the number of points earned, as follows:

A = 940-1000 points	B- = 800-839.9 points	D+ = 650-699.9 points
A- = 900 – 939.9 points	C+ = 770-799.9 points	D = 600-649.9 points
B+ = 870 – 899.9 points	C = 730-769.9 points	E = 0-599.9 points
B = 840-869.9 points	C- = 700-729.9 points	

For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

## 12. WORK IN TEAMS/INDIVIDUAL WORK

You will be working in fixed teams of two students for the duration of the semester **on specific tasks and assignments, as indicated in the instructions**. Note that all quizzes and exams as well as some assignments need to be completed on an individual basis. Teams will be formed by individual students during the first day of class based on seating. The seat you select on the first day of class will be your designated seat for the remainder of the course. This will facilitate tracking of samples as well as the instructor's ability to learn the students' names.

## 13. MID-TERM EXAM

There will be one mid-term exam during one of the regular lab sessions (see course schedule for exact date). The exam will be a mixture of multiple choice/ multiple answer/ true-false/ fill-in-the-blank questions and calculations on topics covered during the weeks preceding the exam. You do not need to memorize protocols (volumes, incubation times, centrifuge speeds), but you will need to understand what happens at the different steps of the protocols we have used. Details on the way the exam will be structured will be discussed further in class.

## 14. FINAL EXAM

A cumulative final exam (similar in format to the mid-term) that covers **the entire semester's material** will be given on the last day of class in a classroom to be determined.

## 15. ONLINE ASSIGNMENTS

Four on-line exercises will be assigned through the MCB4034L Canvas course website during the semester (see schedule for due dates). Two of these will consist of questions/tasks related to an online web tutorial, protocol, software or other resource. A third assignment will rely on the use of a common software (SnapGene) for sequence alignment, and the fourth is based on a research article from the primary scientific literature that describes the expression and purification of a recombinant protein and that is to be selected by each student individually according to their own interests. Answers to a series of questions pertaining to the selected article will need to be submitted. Extra-credit assignments may be offered at the discretion of the instructor.

## 16. QUIZZES

Nine on-line quizzes will be administered through the MCB4034L Canvas course website throughout the semester. These **open-book quizzes** serve two purposes: (1) to evaluate understanding of concepts discussed in class (maintain engagement and provide feedback) and (2) to promote reading of the lab protocols before they are reviewed in class, as a way to ensure preparation. These quizzes will typically be comprised of 4-6 multiple choice or fill-in-the-blank

type questions based on the relevant lab protocols. They are worth 25 points each and will be available for 10-12 minutes. *The time allotted for the quizzes is “double time” based on how long it will take to answer the questions if you have previewed the course material for that day and reviewed the material from the previous session.* The best eight quiz scores will be counted towards the grade. Missing a quiz due to absence or arriving late will result in zero points. A missed quizz due to an allowable absence means that all eight quizzes a student did take will be used towards the 200 quiz points. In other words, the missing quiz is the quiz that will be dropped at the end of the course. No extensions or “make-up” quizzes will be given.

#### **17. CANVAS HINTS FOR ONLINE ASSIGNMENT SUBMISSION**

It is recommended that you work on online assignments during Help Desk hours whenever possible. If you have a problem while working on an assignment, log out and log back in as quickly as possible. If the assessment is timed, the timer will continue to run while you are logged out. If you still encounter difficulties, take a screen shot of the problem so the Help Desk can investigate, and you will have proof of the problem for your Instructor. Call the Help Desk (352-392-4357) immediately. The Assignment list will also show this Assignment as "submitted" including the date and time of your submission. If your Assignment is not listed as "submitted," you have not submitted the Assignment.

#### **18. REFERENCE LETTER POLICY**

Upon request, Dr. Vermerris will write a limited number of reference letters for students applying to graduate and/or professional school who meet the following conditions: (1) Student has achieved a final letter grade of “A” in the class, (2) Student has no unexcused absences, (3) Student has no incomplete or missing coursework (on-line and in-class assignments, quiz, exams, etc.), (4) Student has actively participated during the course (on-time record, asked questions, volunteered answers; no disruptive behavior).

#### **19. COURSE EVALUATIONS**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. The feedback will help efforts to enhance instruction in subsequent semesters. 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/>.

#### **20. IN-CLASS RECORDING**

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.

#### **21. Academic Honesty, Software Use, Campus Helping Resources, Services for Students with Disabilities**

##### **Academic Honesty**

In 1995 the UF student body enacted an [honor code](#) and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by

students.

UF students are bound by The Honor Pledge, which states: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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.” The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here to read the Conduct Code](#). If you have any questions or concerns, please consult with the instructor or TA’s in this class. Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office.

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. **Violations will be reported and will result in penalties.**

PLEASE NOTE THAT ALL UNAUTHORIZED DISTRIBUTION OR ONLINE POSTING OF MCB4034L COURSE MATERIALS IS CONSIDERED A FORM OF ACADEMIC DISHONESTY AND SUCH ACTIONS WILL BE TREATED ACCORDINGLY. The course materials (lecture notes, lab protocols, assignments, etc.) are assembled and intended for students taking MCB4034L ONLY, this is why they are only available for student use from the secure Canvas MCB4034L course website. Unauthorized posting of course materials infringes on UF's copyright policies and the "Fair Use" Act (<http://www.generalcounsel.ufl.edu/faq/Copyright.pdf>). This policy will be vigorously upheld at all times in this course.

### **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.

### **Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general well-being 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.

#### *University Counseling & Wellness Center*

3190 Radio Road  
352-392-1575,  
[www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/)  
Counseling Services  
Groups and Workshops  
Outreach and Consultation  
Self-Help Library  
Training Programs  
Community Provider Database

#### *Career Resource Center*

First Floor JWRU  
352-392-1601  
[www.crc.ufl.edu/](http://www.crc.ufl.edu/)

#### *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. 0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

It is important for students to share their accommodation letter with the instructor and discuss their access needs as early as possible in the semester.

Office of Academic Support Services:  
<https://oas.aa.ufl.edu/services/>

Student Life Success Services:  
<https://www.ufl.edu/student-life/success-services/>

To find and contact your Academic Advisor:  
<http://www.ufadvising.ufl.edu/college-remote-advising-contacts/>

## 22. TENTATIVE COURSE SCHEDULE

*\*This schedule is subject to change\**

*Please monitor announcements from the instructor sent via Canvas with due dates for assignments*

Fall 2024 schedule							
MCB4034L (Vermerris)							
Date	Week	Lab	Quizzes	Assignments	Exams	Course Objective	
22-Aug Thu	1	Expectations, safety, rationale for the experimental procedures; practice gels					1
27-Aug Tue	2	plasmid miniprep; measure concentration;	1				1, 2
29-Aug Thu		plasmid digest; agarose gel electrophoresis; gel extraction and purification	2	RT-PCR			1, 3
3-Sep Tue	3	measure concentration; RT-PCR, agarose gel, cleanup PCR, measure conc.; PCR product digest					1, 2, 3
5-Sep Thu		(PCR product digest); ligation, transformation	3	Primer design			1, 2
10-Sep Tue	4	pick colonies; colony PCR, inoculate cultures; agarose gel, select colonies	4				1, 2
12-Sep Thu		plasmid miniprep; measure concentration; submit to sequencing; Q&A	5				1, 2
17-Sep Tue	5	mid-term exam (in class; need lap top and calculator; closed notes)			Mid-term exam		1, 2, 3
19-Sep Thu		analyze sequence data; transform BL21 cells	6				1, 2, 4
9/24/24 Tue	6	prepare cell lysate					1, 2
26-Sep Thu		protein purification (IMAC)	7	plasmid design			1, 2
1-Oct Tue	7	Work on assignment (plasmid design)	8				1, 2, 3
3-Oct Thu		PAGE, make western blot	9	Research article review			1, 2
8-Oct Tue	8	immunolabeling of western blot; functional assay; Q&A for exam					1, 2, 3
10-Oct Thu		backup in case of hurricane; work on assignment 4			Final exam		1,2,3,4
15-Oct Tue		final exam (in class; need lap top and calculator; closed notes)					1,4
19-Oct Fri		Assignment 4 is due					
Reading material (protocols, background information) will be available in Canvas, under Modules, organized by week							
Due dates and times of assignments will be communicated via email and Canvas							
Submission of assignments, quizzes and exams via Canvas							
<b>Course objectives (from syllabus)</b>							
1 Theory, advantages and limitations of lab procedures							
2 Use of software for data analysis; interpretation of results; troubleshooting							
3 Calculations (concentrations, dilutions)							
4 Application of lab procedures to the production of recombinant protocols							