Microbiology: Syllabus

I. Instructor & GE

Instructor: **Avinash D Singh Bala**, Ph.D. (avinash@uoregon.edu)

Office Hours: Mon 11 AM to 12 PM; Fri 10 AM to 11 AM. *Location*: Huestis 219/228

GE: **Kaye Shek** (kshek@uoregon.edu)

Office Hours: Tue 9 AM to 10 AM. *Location*: Klamath 32

II. Lecture Details

When: WF 08:30 – 09:50,

Where: 240A MCK

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III. Course Description

Microbiology has captured human interest since Anton van Leeuwenhoek peered into his home-made telescope, and found life teeming everywhere, at a scale our species hadn't considered before. Many brilliant scientists helped us learn about microorganisms – their types, structure and biology, that they don't appear out of thin air, and how much they impact our lives directly, be it by fermenting wine or cheese or by causing disease. This course introduces students to the cell biology, physiology, evolution and ecology of microorganisms.

IV. Course Details and Learning Objectives

The course will be organized into four parts, roughly paralleling the organization of the textbook. Students will learn about classical experiments as well as recent discoveries to gain an appreciation for the diversity and elegance of microbial life strategies, the role of microorganisms in global processes, and microbial interactions with macroorganisms. We will explore how the scientific process is applied in microbiology and become familiar with modern experimental methods for studying microorganisms in the laboratory and in their natural habitats.

Part 1: Microbial Cell biology

This section introduces microbes and forms the foundation for the rest of term.

- Introduces the structure and function of microbial cells, and the practical applications of that knowledge – for example, how antibiotics attack bacterial-specific processes.
- Students will learn how microbial populations grow, and how this growth can be controlled.

Part 2: Microbial Genetics and Evolution

How is genetic information inherited, and in the absence of sexual reproduction, exchanged between microbial cells, and how is the genetic information expressed?

- The simpler genetic structure of bacteria lends itself to genetic analysis, and has helped elucidate function and behaviors of microbial species, including their ability to communicate, move, and sense their environment.
- We will consider the origins of life on earth. We may consider this an anthropocene era, but microbes first shaped and diversified our planet. Finally, we will discuss how microbial genes and physiologies have been harnessed for human benefit.

Part 3: Physiology and functional diversity

The third part of the class focuses on the functional and metabolic diversity of microorganisms.

- We will study the metabolic strategies used by different classes of microorganisms that live in remarkable environments and use remarkably limited resources – including light and different inorganic compounds.

- You will learn how these different strategies complement one another to structure microbial communities.

Part 4: Interactions and impacts of microorganisms

The final portion of the class focuses on the ecology of microbes and considers how microbial metabolisms function in concert in different environments.

- What approaches have microbiologists devised to study microbial communities in their natural environments?
- Students will learn about microbes and microbial communities that co-exist with plants and animals, interactions that range from pathogenic to mutualistic relationships.

Prerequisites

The prerequisites for this course are BI214 or BI252. The course assumes knowledge of biologically important macromolecules and familiarity with basic cellular processes such as DNA replication, transcription, translation, and regulation of gene expression.

Student Workload and Commitment

One undergraduate *credit* hour equals 30 *real* hours of student work, typically 10 hours in class and 20 hours outside of class. This is a 3 credit course which means you will be spending a significant amount of time in preparing for class, review, self-study and learning through explorations and assignments (see UO Student Handbook, section Academic Success). Full attendance and active participation are critical to your chances of success in this class, and will be assessed via iClicker feedback.

Course materials

Textbook: ***Microbiology: An Evolving Science (4th ed)*****.** Slonczewski, Foster (W. W. Norton) Available at the UO Bookstore and will be on 2-hour reserve in the Science Library.

Website. Canvas (canvas.uoregon.edu) will be used to post all announcements, lecture notes, additional readings, media, practice problems.

Lecture notes. Lecture notes will be posted on Canvas the evening before class. These notes are merely an outline of what is to be discussed in class to aid in note taking; they are not a substitute for coming to class and will not completely cover all material to be discussed in class. If you miss class, it is your responsibility to obtain detailed notes from a classmate, as the instructors will not provide them.

Readings and media: Additional materials required for the class, if any, will be posted with the lecture notes on Canvas. Problem sets will also be posted each week to help guide learning and self-assessment in preparation for weekly quizzes.

iClickers. We will use iClickers to track attendance and assess learning and participation.

V. Course Policies

Accessibility

The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please let me know as early as possible, in person or via email. For accommodations to aid in your participation, please contact Accessible Education Services as early as possible, in 164 Oregon Hall, by phone at (541) 346-1155 or uoaec@uoregon.edu. I welcome the chance to help you learn, and will work with you to help make it a good learning opportunity and experience. Second language learners who have used a translator in prior courses should meet me as soon as possible.

Classroom Etiquette

Please arrive on time. Lectures begin promptly on the hour. Questions are welcome, but the Instructor may postpone lengthy discussions to a later time. Laptops and other electronic devices are not to be used unless explicitly permitted. Please do not leave early as this is disruptive to everyone. If you have an unusual circumstance and must leave early, please inform the instructor, and sit near the exit so your leaving is not disruptive. Finally, please be respectful of your fellow students.

Acceptable technology use in the classroom

If you choose to use a laptop or tablet computer for note taking, please sit toward the back of the classroom (unless the instructor requests otherwise) so that your screen content does not become a distraction to others. If we notice you are using an electronic device for non-class related activities, you will be asked to refrain from bringing it to further lectures. Cell phone use is prohibited during lectures. All electronics (e.g. cell phones, music players, laptops, tablets, headphones, earphones) must be out of reach during all quizzes and exams. Instructor permission is required for recording lectures.

Academic integrity

All students are expected to conform to the Student Conduct Code. Please note that Instructors are required to report academic misconduct with the Director of Student Conduct and Community Standards. Students are encouraged to discuss class material with one another. However, all submitted work including the weekly homework and the writing assignment must be the original work of each student. Distribution of course materials, including exams, problem sets, quizzes, outside of those enrolled in the Spring 2019 Microbiology BI330 class is strictly prohibited.

Out of Class – Office Hours, and Email Etiquette:

Instructor and GE will be available during designated times, and will make accommodations for students whose schedules preclude office hour attendance. In general, questions are best asked in person, when comprehensive answers are possible. We will respond to emails as expediently as possible during working hours, for simple queries that can be addressed in brief. Emails must include 'BI330' in the subject line, and being part of the academic interaction, must be respectful and professional in tone. Students may not drop in on Instructor or GEs in their lab or research spaces outside of office hours or

scheduled appointments. Instructor and GEs will not respond to phone calls or text messages.

VI. Grading

Student Assessments

Grading will be based on a set of assessments worth 130 points, out of which some will be dropped to give you the best chance for a higher grade:

1. 50 points: 8 weekly in-class Quizzes 10 points each. Lowest 3 are dropped
2. 20 points: One cumulative Final. 3 units of 10 points each. Lowest is dropped.
3. 20 points: 10 Canvas homework assignments (can't be dropped)
4. 5 points: Favorite Microbe Write-up (can't be dropped)
5. 5 points: in-class iClicker participation (can't be dropped)

Your grade will be calculated as follows:

- Homework + Write-up + iClicker (30) + 2 units from final (20) + 5 best Quizzes (50) = 100 total

Weekly In-class Quizzes (weekly; 50% = best 5 of 8) will occur every Wednesday during the last 20 minutes (9:30-9:50) of lecture and must be turned in before the Instructors leave the room. Weekly tests will cover material from previous week's lectures, and will be higher order learning assessments, and may require longer answers or ask you to illustrate your answers. No reference material for any kind will be permitted, unless otherwise indicated. Early or make-up test will not be offered for any reason, since 3 lowest scoring quizzes will be dropped - missed quizzes will grade a 0, and will count among your dropped quizzes. There will not be a weekly Quiz during weeks 1 and 10.

Canvas homework assignments (weekly 2% ea;20% total) are designed to help you read and practice for the in-class quiz. Regular low-stakes assessments are designed to help you keep up with your reading, and to prepare you for in-class quizzes and the final. These will be posted online each Friday at 6 pm, and must be completed by midnight on Tuesday. There will be short-answer questions (MCQ, True/Falso, Fill-in-the-Blanks), and will be graded automatically. The first will be available at the start of week 1, and will be available until Thursday – much later than usual.

Final Exam (20%) **10:15 am, Tuesday, June 11**. The final exam will follow a format similar to the quizzes. It will test your ability to apply knowledge and synthesize concepts learned throughout the quarter. The final will be organized in 3 sections worth 10 points each, and the lowest scoring section will be dropped.

Participation. (5%): Participation will be graded using in-class iClicker responses. Responding to 66% or more of the iClicker opportunities in a lecture gets you credit for that lecture, and getting credit for 85% of the lectures gets you 100% of the participation credit. If your participation score is below 85%, you will get that %age of 5 points as your participation grade.

Favorite Microbe Write-up. (5%): At the end of week 5, you must submit a topic – a microbe, a microbial process, product or interaction that interests you – and by week 10, you must submit a *short*, *polished* write-up of that topic via Canvas (max 500 words). The best 10 write-ups will be displayed on a 'BI330 Microbiology page' published by the instructor. Example topics could be microbes that cause a disease, contribute to industry, make products we use, or are amazing in some way that appeals to you. More details will be available on the Canvas assignment page.

Practice Problems will not be graded but are composed of example quiz questions to prepare you for the quizzes.

Course Grade: End-of-quarter point totals will be adjusted on a curve, if class average is significantly lower than recommended. Letter grade assignments will approximate standard cutoffs (90% A-, 80% B-…), but will ultimately be determined by gaps in the grade distribution. Grade totals displayed in Canvas will not reflect the final adjustment, but are intended to be a close underestimate of current grade.