FLORIDA ATLANTIC UNIVERSITY

COURSE CHANGE REQUEST
Graduate Programs

Department Charles E. Schmidt College of Science

College Biological Sciences

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner _____
Catalog _____

***Current* Course Prefix and Number**	***Current* Course Title**
MCB 6672	Plant Microbiomes and Applications

*Syllabus must be attached for **ANY** changes to current course details. See Template. Please consult and list departments that may be affected by the changes; attach documentation.*

Change title to:

Change prefix

From: **To:**

Change course number

From: **To:**

Change credits*

From: 2 **To:** 3

Change grading

Over the years, content was added and this courses is now more appropriate as a 3 credit course.

From: **To:**

Academic Service Learning (ASL) **

Add ☐ **Remove** ☐

* See Definition of a Credit Hour.
** Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Change description to:

Change prerequisites/minimum grades to:

Change corequisites to:

Change registration controls to:

Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade.

Effective Term/Year for Changes: Fall 2025

Terminate course? Effective Term/Year for Termination:

Faculty Contact/Email/Phone Dr. Esiobu/nesiobu@fau.edu/561-297-4306

Approved by	***Date***
Department Chair Sarah L. Allison	Sept 23, 2024
College Curriculum Chair	09/24/2024
College Dean	10/02/2024
UGPC Chair	10/02/2024
UGC Chair	10/02/2024
Graduate College Dean	
UFS President	
Provost	

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.

Biological Sciences Department
Charles E. Schmidt College of Science
Florida Atlantic University, Boca Raton Campus

Plant Microbiomes and Applications
Syllabus Fall 2025

1. **General Microbiology MCB 6672 3 credit hours**
   CRN#
   Fall 2025, August – December 2025

2. **Course Prerequisites or co-requisites**
   Prerequisites: None.
   General Microbiology MCB 3020 or Medical Bacteriology MCB 4203 are recommended.
   Instructor Permission: None

3. **Course logistics**
   Tuesdays **2:30 am – 5:20 pm**
   Class location – FAU, Boca Raton Campus, SC 119 or TBD

4. **Instructor contact information**

Instructor:	Nwadiuto Esiobu, Ph.D.
Office address:	Sanson Science Bldg. Room 271
Office hours Tutorials:	T 1:30 – 2:30 pm..
Contact telephone number:	Office 561 297-4306
E-mail address:	nesiobu@fau.edu (Preferred mode of communication)

5. **Course Description**
   Plant Microbiomes and Applications is a graduate level course for scholars and researchers in environmental sustainability, environmental conservation, agriculture and related fields. The course explores the rapidly accumulating information of the enormous diversity of microbes on plants using multiple formats – Flipped Classroom, Lectures, Case studies and Peer Learning. Bacteria will be the major focus. The community structure of the microbiomes and their interaction with, and effects on the plant Phyllosphere / Phyllosplane, Caulosphere and Rhizosphere will be discussed. The biotic and abiotic factors responsible for shaping the evolution and community structure and impact of these organisms will be discussed. Using case studies is Citrus greening, Invasive Plants, Endangered plants and Genetically modified plants etc the applications of Plant Microbiomes in solving ecological problems will be covered. Concept of Bio-fertilizers and Bio-inoculate formulation will be introduced. The course is organized into modules viz;
   1) Introduction to Bacteria and Mycorrhizal microbes
   2) Plants as Microbial hosts and habitat
   3) Types of microbial interactions with Plants – Mutualism, Commensalisn, Others
   4) Phyllosphere and Caulosphere microbiomes
   5) Rhizosphere microbiomes of various plants
   6) Engineering Plant Microbiomes for Sustainability – Synthetic Consortia and Bio-inoculants and Plant Boosters
   7) AI in sustainable microbiome in agriculture research and technology (AI SMART)
   8) Scientific Research and Communication on Plant and Microbes
   9) Other applications

6. Course objectives / student learning outcomes

Students who successfully complete this course will develop competence in

1. Discussing the diversity and importance of the microorganisms to plants
2. Describing the diversity and functional roles (including molecular basis where known) of the plant microbiota at various growth stages
3. Analyzing the biotic and abiotic factors that shape the colonization and outcome of Plant * Microbe encounter.
4. Explaining the various applications of microbial inoculants and biofertilizers
5. Advanced Data collation, analysis and communication.

7. Tentative Topical Course Outline

Week /Date	TOPICS	Assigned Reading
Module 1	**Introduction to Bacteria and Mycorrhizal Microbes**	
Week 1: **XXXXXX**	Introductions and course dynamics Lecture: Origins of microbes and microbiology Concept of microbiome. BACTERIA Sample and culture phyllosphere and rhizosphere bacteria of the plants presented. Sow seeds in the pots provided and label carefully Review seminal article: Plant–microbiome interactions: from community assembly to plant health | Nature Reviews Microbiology https://www.sciencedirect.com/science/article/abs/pii/B9780128197158000070 Plant virome: current understanding, mechanisms, and role in phytobiome - ScienceDirect	Course material - Powerpoint
Week 2	Introduction to Plant Microbiomes – Mycorrhizae Care for plants. Extract DNA from rhizosphere metagenome http://www.mykepro.com/mycorrhizae-benefits-application-and-research.aspx	Handout
Module 2	**Plants as Microbial hosts and habitat**	
Week 3:	Plant Host-Associated Mechanisms for Microbial Selection **https://www.frontiersin.org/articles/10.3389/fpls.2019.00862/full** Paper for Discussion Authenticate extracted DNA – Qubit and Nanodrop	See relevant journal
Week 4:	**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5983726/** Plant–Microbe Interaction 2017—The Good, the Bad and the Diverse Hands-On: Apply inoculants and care for plants	Assigned journal and class handout

Week 5	**Exam 1 (15% of grade)** Quarter report from hands-on experiments	
Modules 3 & 4	Types of microbial interactions with Plants – Mutualism, Commensalism, Mutualism Phyllosphere microbiomes	
Week 6:	roup-led discussions. (10% of grade – PPT and audiovisuals) Legumes and Rhizobiaceae (Mutualism) Florida Citrus and Liberibacter (Pathogenic) Sugarcane rhizobiomes (Commensals and others) The Mangroves (Sulfur cycling bacteria – Mutualists and co) Invasive plants – Esiobu and Dawkins (2015) Hands-on- Purify isolates for characterization	Journal articles
Week 7:	Determinants of Types of Plant-Microbe interaction contd Salinity, Organic matter, Soil type, Hydrological status, Plant genotype, Temperature, etc Hands-on- Store isolates in collection	Journal articles
Week 8:	Phyllosphere : The Role of the Phyllosphere Microbiome in Plant Health and Function htt s://onlinelibrar .wile .com/doi/abs/10.1002/9781119312994.ap r0614	Lecture ppt
Module 5	**Rhizosphere microbiomes**	
Week 9: ~~XXXXX~~ ~~10/8/24~~	**Lectures** htt s://www.ncbi.nlm.nih.gov/ ubmed/23790204 The rhizosphere microbiome: significance of plant beneficial, plant pathogenic bacteria	
Week 10	he Fungal and Bacterial Rhizosphere Microbiome Associated Witl Grapevine Rootstock Genotypes in Mature and Young Vineyards **htt s://www.frontiersin.or /articles/10.3389/fmicb.2019.01142/fi**	Read Paper
Week 11	E 2 l<% f fi d	
Module 6	Engineering Plant Microbiomes for Sustainability – Biofertilizers and Bio-inoculants	
Week 12 :	Case Studies Hands on Collect data from plants planted in week 1 and analyze. Compare yield and biomass and soil health ---- WHC, Organic matter, pH, Moisture etc	Handout Find articles
Week 13:	Rhizosphere microbiome structure changes to enable wilt resistance in tomato Class discussions. https://www.nature.com/articles/nbt.4232	Read article

Module 7	Research and Communications	
Week 14:	Work on final group project presentations	
Week 15 - 16:	**Group presentations and final report (15 % of grade)**	

8. Course evaluation method

A. Grade Components/Format

1) Attendance	30% of Final grade
2) Exams 1 and 2	30 % Final grade
3) Hands-on exercises and report	20 % Final grade
4) Group Research and Presentation	20 % Final grade

Two equally weighted exams will be given on the indicated days

B. Grading Scale for this course is as follows:

A	=	93 – 100%	C	=	73 – 76.99%
A-	=	90 – 92.99 %	C-	=	70 – 72.99%
B+	=	87 – 89.99%	D+	=	67 – 69.99%
B	=	83 – 86.99%	D	=	63 – 66.99%
B-	=	80 – 82.99%	D-	=	60 – 62.99%
C+	=	77 – 79.99%	F	=	≤ 59.99%

"C" is required to pass this course

9. **Policy on makeup tests, late work and incompletes**

Please note all the deadlines and due dates in this syllabus. You will not be allowed to make-up assignments and quizzes and exams except in qualifying circumstances as per your student handbook. Also, FAU regulations require me to give all no shows an F grade in the exam. However, with the instructor's prior approval; a candidate could take a make-up exam with a penalty of 10 points. Incomplete grades are given to students who are PASSING but who could not complete course requirements due to circumstances beyond their control. It is awarded at the sole discretion of instructor.

This syllabus is subject to change. Verbal announcements during class followed by an email sent to the address on record will constitute sufficient notification of such alterations.

10. Suggested non required Text and Readings

□ Prescott's MICROBIOLOGY 2016 10th Edition McGraw Hill Higher Education Publishers. www.mhhm.com

11. **Classroom etiquette policy regarding electronic devices**

University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions." You may use audio-recorders to record the lectures.

12. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodation due to a disability to properly execute coursework must register with the Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of the FAU's campuses -- in Boca Raton, SU 133 (561-297-3880); in Davie, (954-236-1222); and Jupiter, SR 117 (561-799-8585), however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

13. Honor Code policy statement
Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 at http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf

14. Religious Accommodations:
Students who wish to be excused from coursework, class activities or examinations must notify the instructor at least three weeks in advance of their intention to participate in religious observation and request an excused absence. The instructor will work with the student to schedule a penalty-free makeup within reasonable limits of time.
Please see www.fau.edu for emergency phone numbers and hurricane advisories.

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15. Special course requirements (if applicable) – Not applicable

16. FAU Attendance Policy Statement:
Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting.

17. Counseling and Psychological Services (CAPS) Center
Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau,edu/counseling/