FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department Biological Sciences

College CESCOS

(To obtain a course number, contact erudolph@fau.edu)

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

Prefix MCB **Number** 6672	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code**	**Type of Course** Lecture	**Course Title** Plant Microbiomes and Applications
Credits *(Review Provost Memorandum)* 2 **Effective Date** *(TERM & YEAR)* Summer 2020	**Grading** *(Select One Option)* **Regular** X **Sat/UnSat**	**Course Description** *(Syllabus must be attached; see Guidelines)* This course explores microbial associations with plants and the roles they play in plant health, invasion, disease and yield. Emphasis is on the microbiomes of the phyllosphere, caulosphere and rhizosphere of plants with applications in conservation ecology, horticulture and agriculture	
Prerequisites None ***Prerequisites, Corequisites and Registration Controls are enforced for all sections of course.***		**Academic Service Learning (ASL) course** Academic Service Learning statement must be indicated in syllabus and approval attached to this form. **Corequisites** None	**Registration Controls** *(For example, Major, College, Level)* All graduate students in the Life Sciences and Environmental Studies
Minimum qualifications needed to teach course: Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)		**List textbook information in syllabus or here**	
Faculty Contact/Email/Phone Dr. Nwadiuto Esiobu/nesiobu@fau.edu/954-559-3369		**List/Attach comments from departments affected by new course** Environmental Sciences Program	

Approved by	***Date***
Department Chair Sarah L. Dotts	2-7-2020
College Curriculum Chair Christyan Bertin 2020.02.10 09:44:13 -05'00'	
College Dean Walt Dot Kolis	2/10/2020
UGPC Chair	
UGC Chair	
Graduate College Dean	
UFS President	
Provost	

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

FAUnewcourseGrad, created Fall 2019

GRADUATE COLLEGE
FEB 10 2020

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

Plant Microbiomes and Applications Syllabus
Summer 2, 2020

1. **Plant Microbiomes and Applications: MCB 6672** **2 credit hours**
   CRN#XXX
   Summer 2, 2020: May 16 – June 26, 2020

2. **Course Prerequisites or co-requisites**
   Prerequisites: None. General Microbiology MCB 3020 or Medical Bacteriology MCB 4203 are recommended
   Instructor Permission: No

3. **Course logistics**
   Tuesdays and Thursdays **2:30 pm – 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:	Tuesday/Thursday 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 and Fungi 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 Algal blooms 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 seven 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, Mutualism
   4) Phyllosphere microbiomes
   5) Rhizosphere microbiomes
   6) Engineering Plant Microbiomes for Sustainability – Biofertilizers and Bio-inoculants
   7) Scientific Research and Communication on Plant and Microbes

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: 5/19/2020	Introductions and course dynamics Lecture: Origins of microbes and microbiology Concept of microbiome. Tech trends: https://www.youtube.com/channel/UCyz6-taovlaOkPsPtK4KNEg?v=4bAXDcWjYOA https://www.youtube.com/watch?v=g2SiljDaMl8 Assignment: Watch the enclosed video Read / review following articles https://www.nature.com/search?q=microbiome	Prescott 10th Ed Ch 11 Review Class Handout
5/21/2020	http://www.mykepro.com/mycorrhizae-benefits-application-and-research.aspx	Handout
Module 2	Plants as Microbial hosts and habitat	
Week 2: 5/26/2020	Plant Host-Associated Mechanisms for Microbial Selection **https://www.frontiersin.org/articles/10.3389/fpls.2019.00862/full** Paper for Discussion	Course handout. See relevant journal
5/28/2020	**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5983726/** Plant–Microbe Interaction 2017—The Good, the Bad and the Diverse	Assigned journal and class handout
Modules 3 & 4	Types of microbial interactions with Plants – Mutualism, Commensalism, Mutualism Phyllosphere microbiomes	
Week 3: 6/02/2020	**EXAM 1** Case Presentations Legumes and Rhizobiaceae Florida Citrus and Liberibacter Invasive plants – Esiobu and Dawkins (2015)	Find relevant articles
6/04/2020	Phyllosphere : The Role of the Phyllosphere Microbiome in Plant Health and Function https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119312994.apr0614	

Module 5	**Rhizosphere microbiomes**	
Week 4: 6/9/2020	**Lectures** https://www.ncbi.nlm.nih.gov/pubmed/23790204 The rhizosphere microbiome: significance of plant beneficial, pathogenic, and human pathogenic microorganisms.	See articles handout & Powerpoint on Canvas
6/11/2020	The Fungal and Bacterial Rhizosphere Microbiome Associated With Grapevine Rootstock Genotypes in Mature and Young Vineyards **https://www.frontiersin.org/articles/10.3389/fmicb.2019.01142/fu**	Read Paper
Module 6	**Engineering Plant Microbiomes for Sustainability – Biofertilizers and Bio-inoculants**	
Week : 6/16/2020	Case Studies	Handout Find articles
6/18/2020	Rhizosphere microbiome structure alters to enable wilt resistance in tomato https://www.nature.com/articles/nbt.4232	Read article
Module 7	**Research and Communications**	
Week 5: 6/23/2020	Group Project presentations	
Week 6: 6/25/2020	**Final Exams**	

8. Course evaluation method

A. Grade Components/Format

1) Five weekly quizzes	30 % Final grade
2) Research paper on chosen topic	20 % Final grade
3) Group Research and Presentation	20 % Final grade
4) Two in-Class Exams	30 % Final grade

1) Quizzes - 30 % Final grade

You will take five tests (quizzes) @ 6 % each every Thursday except the first week . The quizzes will span materials covered, including designated readings. There will be mixed question format.

2) *Two Exams - 55 % 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 (ADAAA), 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, Davie, 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/

RESPONSES

Plant Microbiomes and Applications

From: Dale Gawlik <dgawlik@fau.edu>
Sent: Tuesday, October 1, 2019 11:57 AM
To: Nwadiuto Esiobu <nesiobu@fau.edu>; Dianne Owen <dowen@fau.edu>
Subject: RE: A New Course Proposal for your Review and Comment - MCB 6672 Plant Microbiomes and Applications

Hi Diuto,
No objections from Environmental Science.
Dale

Dr. Dale E. Gawlik
Director, Environmental Science Program
Professor, Department of Biological Sciences
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431
561.297.3333
dgawlik@fau.edu
http://cescos.fau.edu/gawliklab
http://science.fau.edu/envirosci

From: Nwadiuto Esiobu
Sent: Monday, September 30, 2019 4:17 PM
To: Dianne Owen <dowen@fau.edu>; Dale Gawlik <dgawlik@fau.edu>
Subject: Fw: A New Course Proposal for your Review and Comment - MCB 6672 Plant Microbiomes and Applications

Esteemed and Distinguished Colleagues,

MCB 6672 Plant Microbiomes and Applications has been offered twice under the special topics course code (Spring 2017 and Spring 2019) as part of a big Microbiomes course and I would like to have it formerly recorded as a new graduate course.

In order to do so, I am filling out a new graduate course proposal form and under the "Please consult and list departments that might be affected by the new course and attach comments" box, your area (Environmental Science Program) has been identified.

The regulations require me to ask for an email from you stating that your department / Program has no objections to this course.

Please be so kind to send me an email with your comments. Thank you very much for your time.

May I also request that you help to advertise this very timely course to your student population.

I hereby attach the syllabus and new course proposal form.

Warm Regards
Diuto Esiobu

Nwadiuto Esiobu Ph.D.
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Florida Atlantic University
Jefferson Science Fellow, US Department of State
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