

FLORIDA ATLANTIC UNIVERSITY™

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 CATALOG _____

Graduate Programs—NEW COURSE PROPOSAL¹

DEPARTMENT: BIOLOGICAL SCIENCES

COLLEGE: CHARLES E. SCHMIDT COLLEGE OF SCIENCE

RECOMMENDED COURSE IDENTIFICATION:

PREFIX BSC COURSE NUMBER 5467 LAB CODE (L or C) C

(TO OBTAIN A COURSE NUMBER, CONTACT MJENNING@FAU.EDU)

COMPLETE COURSE TITLE: ADVANCED PLANT BIOTECHNOLOGY

EFFECTIVE DATE

(first term course will be offered)

FALL 2014

CREDITS²: 3

TEXTBOOK INFORMATION:

(1) Biochemistry & Molecular Biology of Plants, edited by B.B. Buchanan, W. Gruissem and R.L. Jones (2000), American Society of Plant Physiologists. ISBN # 0-943-0883-72

(2) Plant Functional Genomics, edited by E. Grotewold (2003), Humana Press,

ISBN # 1- 58829-145-6

(3) Plant Biotechnology: the genetic manipulation of plants, by A. Slater, N.W. Scott, M.R. Fowler, 2nd edition (2008). Oxford University Press.

(4) Molecular Cloning, 3rd edition, J Sambrook and D.W. Russell (2001), Cold Spring Harbor Laboratory Press, ISBN # 0-87969-577-3

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR SATISFACTORY/UNSATISFACTORY _____

COURSE DESCRIPTION, NO MORE THAN THREE LINES:

This course combines lectures and labs. Each student has his/her own research project. This course provides materials and training to help students gain current knowledge of structure and function of plant genomes, genes, and gene products; to learn hands-on techniques of DNA- transfer-based plant biotechnology; and to prepare for a professional career in plant/agriculture biotechnology research.

PREREQUISITES*:

COREQUISITES*:

REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)*:

Must be an enrolled graduate student or with the instructor's permission.

* PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE: SPECIALIZATION IN THE PERTINENT FIELDS, CONTINGENT UPON DEPARTMENTAL APPROVAL

Faculty contact, email and complete phone number:
 Xing-Hai Zhang, Ph.D.
xhzhang@fau.edu
 (561) 297-1011

Please consult and list departments that might be affected by the new course and attach comments.³
 Department of Biological Sciences: This course was previously a Special Topics class and needs a new course number.

| | | |
|--|------------------------------------|---|
| <p>Approved by:</p> <p>Department Chair: _____</p> <p>College Curriculum Chair: _____</p> <p>College Dean: _____</p> <p>UGPC Chair: _____</p> <p>Graduate College Dean: _____</p> <p>UFS President: _____</p> <p>Provost: _____</p> | <p>Date:</p> <p>3-21-14</p> | <p>1. Syllabus must be attached; see guidelines for requirements: www.fau.edu/provost/files/course_syllabus.2011.pdf</p> <p>2. Review Provost Memorandum: Definition of a Credit Hour www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf</p> <p>3. Consent from affected departments (attach if necessary)</p> |
|--|------------------------------------|---|

Email this form and syllabus to UGPC@fau.edu **one week before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

BSC 5467C-001 (3 credits)

PLANT BIOTECHNOLOGY FALL

SEMESTER, 2014

Sanson Science Building 119 Wednesdays 9:00-10:20 am

**Sanson Science Building 108 Fridays 9:00-11:50 am Department of
Biological Sciences, Charles E. Schmidt College of Science Florida**

Atlantic University

Instructor: Dr. Xing-Hai Zhang (pronounced like “shing-hi jong”), Associate Professor of Plant Molecular Biology, SC 262, Phone: 561-297-1011, e-mail: xhzhang@fau.edu

Office Hours: Wednesdays, 10:30 am - 4 pm; Fridays, 12 pm - 4 pm, or by appointment

Teaching Assistant: TBA, phone: 561-297-1282, e-mail: @fau.edu; office: SC 258. Office hours: Wednesdays, 1 pm - 3 pm

Suggested Readings:

(1) Biochemistry & Molecular Biology of Plants, edited by B.B. Buchanan, W. Gruissem and R.L. Jones (2000), American Society of Plant Physiologists. ISBN # 0-943-0883-72

(2) Plant Functional Genomics, edited by E. Grotewold (2003), Humana Press, ISBN # 1-58829-145-6

(3) Plant Biotechnology: the genetic manipulation of plants, by A. Slater, N.W. Scott, M.R. Fowler, 2nd edition (2008). Oxford University Press.

(4) Molecular Cloning, 3rd edition, J Sambrook and D.W. Russell (2001), Cold Spring Harbor Laboratory Press, ISBN # 0-87969-577-3

Prerequisites: enrolled graduate students or instructor's permission.

Course Description

This course combines lectures and labs. Each student has his/her own research project. This course provides materials and training to help students gain current knowledge of structure and function of plant genomes, genes, and gene products; to learn hands-on techniques of DNA-transfer-based plant biotechnology; and to prepare for a professional career in plant/agriculture biotechnology research.

Course Objectives

To gain knowledge of structure, function and analysis of genomes, genes and gene products.

To learn hands-on techniques of DNA-transfer based plant biotechnology.

To train for a possible professional career in plant/agriculture biotechnology research.

Students are expected to study for a minimum of two hours for every hour of class time.

Course Content/Topics (Not necessarily in this order.)

1. Introduction of nuclear genomes

2. Introduction of organelle genomes (mitochondrial and plastid)
3. Concepts of genes and gene organization
4. Concepts of gene cloning and expression
5. Gene transfer via biological interaction: *Agrobacterium*-mediated transfer
6. Gene transfer via physical process: particle bombardment (gene gun)
7. Construction of nuclear transformation vectors
8. Construction of chloroplast transformation vectors
9. Plant tissue culture techniques
10. Plant totipotency, cloning and regeneration
11. Extraction and analysis of DNA plasmids from bacteria
12. *Agrobacterium*-mediated transformation, selection and regeneration
13. Chloroplast transformation via particle bombardment, selection and regeneration
14. Identification of putative transgenic plants by selection marker gene
15. DNA analysis of putative transgenic plants: DNA isolation and PCR
16. Protein analysis of transgenic plants: protein extraction, SDS/PAGE, enzyme assay
17. Data processing and report writing
18. Development of research project, proposal and presentation

Course Procedure

This course is composed of two integrative parts — lectures and lab exercises. The lectures will introduce the experiment concepts, update or refresh your knowledge of the subjects and discuss the design, rationale and predicted outcome of an experiment. The major portion of this course is lab exercise. Real experiments are carried out in a real lab setting.

We will attempt to carry out most of the experiments within the allotted time. However, depending on the progress and need of specific projects, you should be prepared to take care of your experiments beyond the class schedule.

Assessment

Your attitude, motivation and effort are among the most important components in performance assessment. Carefully planning and executing experiments, intelligently following protocols, self-motivation, innovation and being inquisitive are all the qualities necessary to be a good scientist. Several written assignments are planned during the course. A comprehensive lab report in a format of a formal scientific publication is required at the end of the course. Successful completion (good results) of your experiments, i.e. generation of a true transgenic plant, will certainly help your grade. A research proposal on a predetermined topic and a 15-min oral presentation of this proposal by each of the students will conclude this class. Late assignments/reports result in the penalty of 20% of the scores per day. More details will be provided in advance.

Tentative schedule for Assessment

- Week 3 Assignment 1
- Week 5 Assignment 2
- Week 7 Assignment 3
- Week 10 Lab report
- Week 14 Research proposal (final)
- Week 15 Oral presentation (final)

Grading

The final letter grade will be based on:

- Assignments: 30%
- Project report: 30%
- Research proposal: 20%
- Oral presentation: 15%
- Attendance: 5%

Assignment of Grades

| Cumulative Performance Percentage | Grade |
|-----------------------------------|-------|
| >94% | A |
| >90% - 94% | A- |
| >87% - 90% | B+ |
| >83% - 87% | B |
| >80% - 83% | B- |
| >75% - 80% | C+ |
| >65% - 75% | C |
| >60% - 65% | C- |
| >57% - 60% | D+ |
| >53% - 57% | D |
| >50% - 53% | D- |
| <50% | F |

Attendance Policy

Attendance is mandatory. Missing a total of two classes shall result in a request of withdraw (grade W) from this class or a grade of "F" if without a valid excuse, or a grade of "I" when applicable. Absence can be excused only under certain circumstances and with valid documentations, such as no more than a couple of times of participation in jury duty, University-approved activities, medical emergency, and religious observance. There is no possibility of making up missed assignments and reports. Missing due deadline results in penalty. Your level of attention, attitude, and effort will always contribute significantly to the success in your study (including this class) and your future career.

Honor Code of Academic Integrity

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

For this class, use of internet for learning and researching is very helpful and is strongly encouraged. However, using others' work without proper acknowledgement is wrong and may fall into the category of academic misconducts. Assignments and reports must be individual efforts and based on your own research data. Plagiarism, even if due to innocent oversight, should be avoided at all cost.

Classroom Etiquette and Lab Safety

You are encouraged to actively participate in discussion and ask challenging questions any time during the lectures. Coming late to class is disruptive. I personally feel annoyed by late comers. All electronic devices must be turned off during class. Laptop computers are allowed only if you do not bother others. No eating, drinking or any other disruptive behaviors are allowed during the lecture or the lab.

We will try to cultivate a relaxed and engaging environment in class to encourage discussion and debates. However, lab safety rules and procedures must be strictly followed since we will be dealing with biohazardous and transgenic materials. You are encouraged to take proper training classes in lab safety offered by FAU. To successfully carry out an experiment, you should follow instructions intelligently, pay attention to details, use instruments/reagents properly and ask when uncertain. And be inquisitive and curious.

Florida Atlantic 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."

Students with Disabilities

In compliance with the Americans with Disabilities Act (ADA), students who require reasonable accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) -- in Boca Raton, SU 133 (561-297-3880); in Davie, LA 240 (954-236-1222); in Jupiter, SR 110 (561-799-8010); or at the Treasure Coast, CO 117 (772-873-3441) -and follow all OSD procedures.



Charles E. Schmidt College of Science
Department of Biological Sciences
777 Glades Road
Boca Raton, FL 33431
tel: 561.297-3320
fax: 561.297-2749

TO: University Graduate Programs Committee (UGPC)
FROM: Rodney Murphey, Ph.D.
Professor and Chair
Department of Biological Sciences
DATE: February 19, 2014
RE: New Course Proposal Consent

To Whom It May Concern:

This note constitutes acknowledgement and consent of the Department of Biological Sciences for the creation of a new course within the department: **BSC 5467C – Plant Biotechnology and Lab.**

Best Regards,

A handwritten signature in blue ink, appearing to read 'R.K. Murphey', is written over the printed name and title of the sender.

Rodney Murphey, Ph.D.
Chairman, Department of Biological Sciences
Director, Life Science Initiative on the MacArthur Campus