

Fayetteville State University
College of Arts and Sciences
Department of Natural Sciences
BTCH 490 – Research in Biotechnology
Fall 2010

I. Locator Information:

Instructor: Muhammad Lodhi
Course # and Name: BTCH 490
Semester Credit Hours: 3-6-0
Day and Time Class Meets: TBA
Class Location: LS 218
Office Location: LSA 320; Lab - LS218

Office hours: MWF (11:00 – 12:00), T (1:00 – 2:00) & WF (8:00 – 10:00) **OR by appointment**
Office Phone: 910-672-1658
Email address: mlodhi@uncfsu.edu
Webpage: <http://faculty.uncfsu.edu/mlodhi>

FSU Policy on Electronic Mail: Fayetteville State University provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail.

Rules and regulations governing the use of FSU email may be found at
<http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf>

II. Course Description: The emphasis in this course is on giving biotechnology students opportunity to develop skills to conduct independent research work. Students learn how to design an experiment, collect scientific information, prepare an outline of the procedures, initiate the project, conduct the experiments specified, write a comprehensive scientific report and make presentation on the findings of the project. Biotechnology students in their Junior and Senior year will be eligible to enroll in this course. Students will work with a mentor willing to provide guidance and oversee the research project.

Pre-requisite: BTCH 220 and BTCH 230, BTCH 360, BTCH 450 or the consent of the instructor

III. Disabled Student Services: In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ACA) of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); 910-672-1203.

IV. Textbook: Basic Laboratory Methods for Biotechnologies, 2nd edition, Pearson. Instructor will provide other published material appropriate for the research work.

V. Student Learning Outcomes – Upon completion of this course, students will be able to:

- a. Demonstrate knowledge of the core concepts related to project planning and experimental design as assessed with the project plan prepared by the student
- b. Display a sound knowledge of important technical, business and ethical issues related to biotechnology and its applications as demonstrated in group discussions and written reports
- c. Critically evaluate and analyze original research publications and ably communicate this through appropriate means such as written reports or oral presentation
- d. Demonstrate a thorough understanding of the *Biotechnology Research* and technical paper writing skills as determined by the progress reports and final research report presented at the end of the semester
- e. Understand the biotechnology job market and develop a plan to obtain a job in a field of choice in academia or industry in collaboration with FSU's career development
- f. Show a greater understanding of the product development process introduced through visits to the biotechnology companies in NC
- g. Develop advanced skills in the use of laboratory equipment and techniques
- h. Maintain laboratory notebook as required in industrial environment
- i. Apply trouble-shooting and problem solving skills in the research projects

VI. Course Requirements and Evaluation Criteria -

- a. Grading Scale – Final grades are calculated on a four-point system and affect a student’s grade point average as indicated below. Faculty members will delineate in each class syllabus the methods and evaluative criteria for determining final grades in the class.

| Grade | Credit Hours | Quality Points | Meaning |
|--------------|------------------------------|-----------------------|---|
| A | Hours attempted and earned | 4 per credit hour; | Exceptionally high |
| B | Hours attempted and earned | 3 per credit hour | Good |
| C | Hours attempted and earned | 2 per credit hour | Satisfactory |
| D | Hours attempted and earned | 1 per credit hour | Marginally passing |
| F | Hours attempted – Not earned | 0 per credit hour | Failing |
| FN | Hours attempted – Not earned | 0 per credit hour | Failing due to non-attendance. (Student registered, but <u>never</u> attended.) |
| W | Hours attempted – Not earned | No impact on GPA | Class withdrawal prior to deadline (see Academic Calendar) |
| P | Hours attempted and earned | No impact on GPA | Satisfactory - Assigned only in classes specified as Pass/Fail |
| WU | Hours attempted – Not earned | No impact on GPA | Withdrawal from all classes for semester or term |
| AU | Hours attempted – Not earned | No impact on GPA | Auditing |

Following standard FSU grading scale will be used

| Percent of Points | Grade |
|-------------------------------|--------------|
| 91 – 100 | A |
| 82 – 90 | B |
| 73 – 81 | C |
| 65 – 72 | D |
| <65 | F |
| Failing due to non-attendance | FN |

- b. Final grade will be based on the following evaluation components

| | Item | Number of Items | Points/Item | Total points | %age |
|----|-----------------------------|------------------------|--------------------|---------------------|-------------|
| 1. | Project Plan | 50 | 50 | 50 | 10 |
| 2. | Lab notebook | 50 | 50 | 50 | 10 |
| 3. | Visits to Companies | 50 | 50 | 50 | 10 |
| 4. | Laboratory Work/Attendance | 150 | 150 | 150 | 30 |
| 5. | Oral or Poster Presentation | 100 | 100 | 100 | 20 |
| 6. | Final Research Report | 100 | 100 | 100 | 20 |
| | Total | 500 | | 500 | 100 |

i) Project Plan: Students will prepare the project plan that lays out all aspects of the project from the experimental design to the procedures. Instructions and rubrics will be provided and discussed

c. Laboratory Notebook: Students will be expected to maintain a suitable laboratory notebook to record all the experiments and procedures done in the project in chronological order. Also written in the notebook will be ideas on new projects and products. The notebook will be endorsed by the course instructor on daily or weekly basis.

ii) Visits to Biotechnology Companies: During the course of the semester, the instructor will arrange visits to two biotechnology companies within NC state. Dates of this mandatory activity will be announced during the semester.

iii) Oral or Poster Presentation: Students will be asked to prepare either oral and/or poster presentation. Template as well as rubrics will be provided. Extensive discussion will be done on this topic

iv) Research Report: The final research report will be in the form of a publishable technical paper. The paper will have summary, introduction, objectives, materials and methods, results, discussion, conclusion, bibliography and acknowledgement. Research paper will be graded based on rubrics provided to the students in the beginning of the semester.

v) Attendance policy: Each student will be expected to spend 6-8 hours/week in doing research work in the laboratory or assignments according to the schedule provided by the instructor. The student will be responsible for filling in the timesheet on weekly basis posted in the laboratory. Lack of participation in research work or other course activities, without medical and family emergencies, will result in point deductions from Attendance.

Please note: If these evaluation criteria must be revised because of extraordinary circumstances, the instructor will distribute a written amendment to the syllabus.

Student Behavior Expectations: The *Code of the University of North Carolina* (of which FSU is a constituent institution) and the *FSU Code of Student Conduct* affirm that all students have the right to receive instruction without interference from other students who disrupt classes.

FSU Core Curriculum Learning Outcome under Ethics and Civic Engagement (6.03): All students will “prepare themselves for responsible citizenship by fulfilling roles and responsibilities associated with membership in various organizations.” Each classroom is a mini-community. Students learn and demonstrate responsible citizenship by abiding by the rules of classroom behavior and respecting the rights all members of the class.

The FSU Policy on Disruptive Behavior (see FSU website for complete policy) identifies the following behaviors as disruptive:

1. Failure to respect the rights of other students to express their viewpoints by behaviors such as repeatedly interrupting others while they speak, using profanity and/or disrespectful names or labels for others, ridiculing others for their viewpoints, and other similar behaviors;
2. Excessive talking to other students while the faculty member or other students are presenting information or expressing their viewpoints.
3. Use of cell phones and other electronic devices
4. Overt inattentiveness (sleeping, reading newspapers)
5. Eating in class (except as permitted by the faculty member)
6. Threats or statements that jeopardize the safety of the student and others
7. Failure to follow reasonable requests of faculty members
8. Entering class late or leaving class early on regular basis
9. No cell phone or text messaging devices will be allowed to be used in the class. A student using cell phone/text message may be asked to leave the class.

Consequences for Failing to Meet Behavioral Expectations: The instructor may take the following actions in response to disruptive behavior. Students should recognize that refusing to comply with reasonable requests from the faculty member is another incidence of disruptive behavior.

1. Direct student to cease disruptive behavior.
2. Direct student to change seating locations.
3. Require student to have individual conference with faculty member. At his meeting the faculty member will explain the consequences of continued disruptive behavior.
4. Dismiss class for the remainder of the period. (Must be reported to department chair.)
5. Lower the student’s final exam by a maximum of one-letter grade.
6. File a complaint with the Dean of Students for more severe disciplinary action.

Students who believe the faculty member has unfairly applied the policy to them may make an appeal with the faculty member’s department chair.

VII. Academic Support Resources – Students who are earning less than a “C” average will be encouraged to attend tutorial sessions provided free by various units and centers below. Student deficiencies will be identified and a plan will be developed for remediation.

<http://www.uncfsu.edu/univcoll/services.asp>

<http://www.uncfsu.edu/learningcenter/>

<http://www.uncfsu.edu/sss/>

<http://www.uncfsu.edu/cpser/tutorialservices.htm>

Online tutoring is also available through Smarthinking: <http://www.uncfsu.edu/fsuretention/smarthinkingflyer.pdf>

VIII. Course Outline and Assignment Schedule - (Attached)

IX. Teaching Strategies – this course is project oriented so emphasis will be on developing and conducting hands-on research work. Students will be provided oral and written input on their projects as well as their performance.

X. Bibliography –

1. Introduction to Bioinformatics, 3rd ed. Arthur Lesk. 2008. Oxford University Press.
2. National Institute of Biotechnology Information (<http://www.ncbi.nlm.nih.gov/>)
3. National Library of Medicine (www.nlm.nih.gov)
4. Genomic Glossaries (<http://www.genomicglossaries.com/>)
5. Nature Biotechnology (<http://www.nature.com>)
6. Science (<http://www.aaas.org>)
7. Genome Research, Cold Spring Harbor Laboratory, NY (<http://genome.cshlp.org>)
8. Biopharmaceuticals: Biochemistry and Biotechnology by Gary Walsh, 1998. J. Wiley Press
9. Basic Biotechnology - Second Edition by Colin Ratledge and Bjorn Kristiansson. 2001. Cambridge University Press
10. Michael Compton. 2005. Use of statistics in biotechnology. Methods in Molecular Biology, 318:145-163
11. Experimental Design in Biotechnology. Perry Haaland. 2005, Marcel Dekker publishers.

**Appendix VI: Course Schedule ---- Research in Biotechnology
(BTCH 490) Fall 2010**

| | Lab Date | Content |
|---------|-----------|--|
| Week 1 | August | 1) Project Design 2) Develop 1-3 page project plan |
| Week 2 | August | 3) Initiate Research Project 4) Training with laboratory techniques 5) Submit a written report on the project |
| Week 3 | September | 1) Conduct Research Work 2) Spend 8-10 hours/week on the research work 3) Complete 1-2 experiments 4) Complete Literature Review on the project 5) Complete writing introduction part of the report 6) Submit a written report on the project |
| Week 4 | September | |
| Week 5 | September | |
| Week 6 | September | |
| Week 7 | October | |
| Week 8 | October | |
| Week 9 | October | 1) Continue with the research work 2) Continue to write and read papers 3) Discuss the results so far 4) Visit research labs at other campuses or commercial companies 5) Submit a written report on the project |
| Week 10 | October | |
| Week 11 | November | 1) Continue Research 2) Discussion on the ongoing project 3) Write Materials and Methods as well as start compiling results 4) Work on making a poster 5) Submit a written report on the project |
| Week 12 | November | |
| Week 13 | November | |
| Week 14 | November | |
| Week 15 | December | 1) Present poster 2) Complete writing the paper |
| Week 16 | December | 1) Submit final paper 2) Submit laboratory notebook 3) Wind-up research |