Revised 9/25/2008

Graduate Council Meeting
February 25, 2009 @ 3:30 pm

Present: Drs, Saleh, Sustich, Grymes (B. Gilbert), Miao McDaniel, Clifft, Buchanan, Jones, Risch, Ms. Tracy Finch, Mr. Peck and Gastineau. Visiting: Dr. Johnson (Biology)

1. New Courses

SW 5803 Full-Time Foundation Field I	TABLED
SW 5813 Full-Time Foundation Field II	TABLED
SW 5802 Part-Time Foundation Field I	TABLED
SW 5811 Part-Time Foundation Field II	TABLED
SW 5812 Part-Time Foundation Field III	TABLED

2. New Emphasis Area

Biology-Biotechnology	APPROVED

Code #

Revised 9/25/2008

Bulletin Change Transmittal Form

☐ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

Bulletin Change
Please attach a copy of all catalogue pages requiring editorial changes.

Department Curriculum Committee Chair	Date	COPE Chair (if applicable)	Date
Department Chair	Date	General Education Committee Chair (if applicable)	Date
College Curriculum Committee Chair	Date	Undergraduate Curriculum Council Chair	Date
College Dean	Date	Graduate Curriculum Committee Chair	Date
		Vice Chancellor for Academic Affairs	Date

1. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)
Aldemaro Romero, ASU Biology, State University, AR 72467, aromero@astate.edu, 870.972.3194

2. Proposed Change
The addition of an emphasis area in the MS in Biology

3. Effective Date
August 15, 2009

4. Justification
There is an increasing need for professional trained in the specific laboratory skills required for employment by molecular biology and biotechnology intensive companies. Few programs exist nationally to supply the need for these professionals and none in Arkansas. Lastly, there is a high graduate student demand for biotechnology training.

From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.

To copy from the bulletin:

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PROGRAM OF STUDY FOR THE MASTER OF SCIENCE DEGREE WITH A MAJOR IN BIOLOGY

Admission Requirements:

There are two tracks for students pursuing a MS degree in Biology. The traditional track is the completion of coursework, research and culminating in the writing of a defensible thesis. A second track is an emphasis in Biotechnology, which includes the completion of coursework intensive in laboratory methodology. Students seeking admission into the Master of Science degree program in Biology must meet the admission requirements of the Graduate School and the specific program requirements.

In addition, applicants for the M.S. program in Biology will be evaluated by the department for academic qualification based upon their undergraduate academic record, score on the Graduate Record Examination, and letters of reference. Specific requirements include:

1. A minimum of 18 undergraduate hours in the biological sciences and an undergraduate grade point of 2.75 or greater (on a 4.0 scale). Students judged to be deficient in some areas of undergraduate preparation may be assigned certain undergraduate prerequisite courses.
2. A minimum GRE combined verbal and quantitative score of 1000.
3. Three letters of reference.
4. A statement of educational objectives and career goals.

Applicants not meeting all of the above departmental criteria may be admitted on a conditional basis if they meet the Graduate School admission requirements. A candidate for the Master of Science degree in Biology must fulfi ll a research tool requirement in addition to completing the 30 hours required for the degree.

Courses required of traditional MS candidates:

BIOL 6003 in addition to courses from any three of the prefixes of BIOL, BOT, ENT, ENVR, and ZOOL, and two 6000 level courses (a single course may meet both prefix and number criteria), exclusive of Independent study, Seminar, and Thesis.

Thesis, six hours;

Electives in Biology or an approved related area as needed to complete 30 hours.

Tool 3-4 hours, as approved by graduate thesis committee.

Minimum hours required for this program: 33-34

Courses required of Biotechnology-emphasis MS candidates:

BIO 6003, BIO 6033, BIO 6141, BIO 6144, BIO 6154, BIO 5133, BIO 5131, CHEM 5243, CHEM 5241, in addition to a tool course, 3-4 hours, as approved by graduate committee. Electives in Biology or an approved related area as needed to complete 36 hours.

Minimum hours required for this program: 36

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For Registrar's Use only

Code #

New Program Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☐ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

New Program (The following critical elements are taken directly from the Arkansas Department of Higher Education's "Criteria and Procedures for Preparing Proposals for New Programs".) Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

Department Curriculum Committee Chair	Date	COPE Chair (if applicable)	Date
Department Chair	Date	General Education Committee Chair (if applicable)	Date
College Curriculum Committee Chair	Date	Undergraduate Curriculum Council Chair	Date
College Dean	Date	Graduate Curriculum Committee Chair	Date
		Vice Chancellor for Academic Affairs	Date

1. Proposed Program Title

MS Biology, with Biotechnology emphasis (Emphasis area is proposed)

2. CIP Code Requested

26. 0101

3. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)

Dr. Aldemaro Romero, Chair; Department of Biological Sciences
College of Science and Mathematics; Arkansas State University
PO Box 599; State University, AR 72467

4. Proposed Starting Date

Fall, 2009

5. Program Summary (Provide a general description of the proposed program. Include an overview of any curriculum additions or modifications; program costs; faculty resources, library resources, facilities and equipment; purpose of the program; and any information that will serve as introduction to the program.)

The major purpose of this emphasis is to train graduate students to work as technicians in biotechnology industries and laboratories, in the areas of medicine, pharmaceuticals, industry, and agriculture. This degree emphasis will not be designed as an entree into a Ph.D. program, but rather as a terminal masters degree. Cohorts of 25-30 students will be accepted into this program each year. The primary function of this program will be to train students in the techniques required to be competitive in this job market. With the growth of positions in the biotechnology industry both nation-wide and internationally, the demand for persons with training in this industry is high and expected to continue significant growth. (Letter of Notification is attached).

6. Need for the Program (Provide survey data on student interest, job availability, corporate demands and employment projections. Focus mostly on state needs and less on regional and national needs, unless applicable to the program.)

There is an increasing need for professionals trained in the specific laboratory skills required for employment by molecular biology and biotechnology intensive companies. Few programs exist nationally to supply the need for these professionals, and none in Arkansas. The institution closest to ASU-Jonesboro that offers a program similar to the one we propose is Middle Tennessee State University (Professional Science Master's). ASU-Jonesboro has already experienced a high student demand for such a program, particularly from international students. For example, in the past year ASU has received about 50 applications for graduate degrees in Biology, with most of those applicants requesting entry into a biotechnology program. This degree is designed as terminal masters degree, integrating classroom courses stressing concepts and theory with an intensive laboratory experience focused on technique and acquisition of skills required by a professional biotechnologist. The curriculum will include 36 academic credits, including two intensive 3- hour laboratory methods courses. This program will be able to satisfy the academic and training needs of a large applicant pool.

7. Curriculum Outline (Identify new courses and state program admission requirements.)

BIO 6141 Introduction to Biotechnology (1); BIO 6033 Biosafety and Ethics in Research (3)
BIO 6144 Laboratory in BioTechniques I (4); BIO 6154 Laboratory in BioTechniques II (4)

No additional admissions requirements beyond the traditional MS degree.

8. Faculty (List names, credentials, and rank of faculty who will be teaching courses in the proposed program.)

An Instructor to be hired will teach the 4 courses above. Other involved faculty teach courses presently offered in the MS program.

9. Description of Resources (Current library resources including relevant holdings, current instructional facilities including classrooms, instructional equipment and technology, laboratories.)

Equipment and facilties in ABI, and LSE 302.

10. New Program Costs (New administrative costs, new faculty costs, new library resources and costs, new instructional equipment and costs, distance delivery costs, other new costs. If no new program costs, explain.)

Funding will be required for hiring a non-tenure track full-time Instructor on a 12 month contract. Instructional duties include the teaching of the two Biotechniques lab courses, which will be offered every summer, and the "Introduction to Biotechnology" and "Biosafety and Ethics in Research" courses, which will be offered annually. Administrative duties include the advisement of students in this emphasis area. Salary: $55,000; Benefits: 13,750. All other required and elective courses are already being offered and taught by existing faculty. The increased enrollment in these lecture courses can be absorbed without additional cost.

Funding will be required for the equipment and supplies needed to satisfy the needs of the two summer Biotechniques laboratory courses. The laboratory in LSE 302 is presently a multi-user facility for research in molecular biology, and houses some equipment for DNA/protein isolation, amplification of DNA (PCR) and electrophoresis, and will be used for laboratory instruction. Imaging equipment is also available. Additional equipment is required to meet the demands of the larger number of students taking these summer courses (estimated at 25-30 students per course). Equipment needed for the characterization of proteins, cell culturing, bioreaction, and immunohistochemistry are not available for these courses. Funds for the initial equipment investment will be provided by AAR. Costs required for the repair, replacement and updating of equipment and for expendable supplies are also critical to the success of these courses, but funds for these purposes can be derived from course fees.

Equipment costs: $ 100,000 initially; $5,000 annually
Supply costs: $ 4,000 annually

11. Sources of Funding (Reallocation from where? Tuition and fees? Other?)

Please see # 10 above.

12. Organizational Chart Reflecting New Program

None.

13. Specialized Requirements (Specialized accreditation requirements for the program, Licensure/certification requirements for student entry into the field.)

None.

14. Board of Trustees Approval (The proposed date the BOT will consider the new program.)
March 6, 2009

15. Desegregation (Describe black student recruitment and retention strategies. State the percentage of black students enrolled in institution and projected percentage in new program.)

16. How will this program be assessed?

Assessment will be ongoing through student performance, graduation rate and employment following graduation.

17. Does this affect other programs? If yes, how?
Not in a competitive manner. Courses currently taught in the MS in Biology will have an increase enrollment.

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LETTER OF NOTIFICATION - 3

NEW EMPHASIS AREA

1. INSTITUTION SUBMITTING REQUEST:
Arkansas State University, Jonesboro

2. CONTACT PERSON/TITLE:
Dr. Aldemaro Romero, Chair
Department of Biological Sciences
College of Science and Mathematics
Arkansas State University
PO Box 599
State University, AR 72467

3. PHONE NUMBER/E-MAIL ADDRESS:
(870) 972-3082 (phone)
(879) 972-2638 (fax)
aromero@astate.edu

4. PROPOSED EFFECTIVE DATE: August 15, 2009

5. TITLE OF DEGREE PROGRAM: M.S., Biology

6. CIP CODE: 26

7. DEGREE CODE: 0101

8. PROPOSED EMPHASIS NAME: Biotechnology

9. REASON FOR PROPOSED ACTION:
There is an increasing need for professionals trained in the specific laboratory skills required for employment by molecular biology and biotechnology intensive companies. Few programs exist nationally to supply the need for these professionals, and none in Arkansas. The institution closest to ASU-Jonesboro that offers a program similar to the one we propose is Middle Tennessee State University (Professional Science Master's). ASU-Jonesboro has already experienced a high student demand for such a program, particularly from international students. For example, in the past year ASU has received about 50 applications for graduate degrees in Biology, with most of those applicants requesting entry into a biotechnology program. This degree is designed as terminal masters degree, integrating classroom courses stressing concepts and theory with an intensive laboratory experience focused on technique and acquisition of skills required by a professional biotechnologist. The curriculum will include 36 academic credits, including two intensive 3- hour laboratory methods courses. This program will be able to satisfy the academic and training needs of a large applicant pool.

10. NEW EMPHASIS OBJECTIVE:

11. **A. LIST OF REQUIRED COURSES:** Degree requirements 36 hours.

Required Courses (Credit hours): 26 hours

BIO 6003 Scientific Methods and Research Design (3)

BIO 6141 Introduction to Biotechnology (1)
BIO 6013 Biosafety and Ethics in Research (3)
BIO 6144 Laboratory in BioTechniques I (4)
BIO 6154 Laboratory in BioTechniques II (4)
BIO 5133/5131 Cell Biology and Lab (4)
CHEM 5243/5241 Biochemistry and Lab (4)
MATH XXX Statistics (3) - several course options are presently available

Elective Courses: 10 hours

MBS 6213 Advanced Cell Biology (3)
BIO 6233 Specialized Biochemistry (3)
MBS 6243 Molecular Genetics and Genomics (3)
BIO 5013 Population Genetics (3)
BIO 5103 Virology (3)
BIO 5113/5111 Immunology and Lab (4)
BIO 5123 Cell Signaling (3)
BIO 5143 Pharmacology (3)
BIO 6023 Genetic Engineering (3)
BIO 5123/5211 Human Genetics and Lab (4)
BIO 6543 Cell & Molecular Neurobiology (3)
BIO 6702 Endocrinology (2)
BIO 6133 Bioinformatics and Applications (3)
BIO 5611 Radiation Safety (1)
BIO 5104 Microbiology (4)
BIO 5001/5003 Laboratory Techniques in Microscopy and Lab (4)
CHEM - need to check appropriate Chem courses here.

B. NEW COURSE DESCRIPTIONS:

BIO 6141 Introduction to Biotechnology (1)
An introduction to the applications, industries and tools of biotechnology, including medicine, pharmaceuticals, industry and agriculture. Lecture one hour per week.

BIO 6013 Biosafety and Ethics in Research (3)
Biosafety in the workplace, including chemical and radiation safety. Examination of moral and ethical issues in the laboratory and in research, including the concepts of transgenics, intellectual property and writing in research. Lecture three hours per week.

BIO 6144 Laboratory in BioTechniques I (4)
Laboratory techniques in protein chemistry and analysis, cell culture, and DNA/RNA isolation techniques. Techniques also include a variety of chromatographic methods, electrophoresis, UV-vis spectroscopy and radiochemistry. (Course fee, $100.)

BIO 6154 Laboratory in BioTechniques II (4)
Laboratory techniques in DNA/RNA analysis and applications, including PCR, real-time PCR, recombinant DNA and the production of gene expression products. (Course fee, $100.)

C. PROGRAM GOALS AND OBJECTIVES:

The major purpose of this emphasis is to train graduate students to work as technicians in biotechnology industries and laboratories, in the areas of medicine, pharmaceuticals, industry, and agriculture. This degree emphasis will not be designed as an entree into a Ph.D. program, but rather as a terminal masters

degree. Cohorts of 25-30 students will be accepted into this program each year. The primary function of this program will be to train students in the techniques required to be competitive in this job market. With the growth of positions in the biotechnology industry both nation-wide and internationally, the demand for persons with training in this industry is high and expected to continue significant growth.

D. EXPECTED STUDENT LEARNING OUTCOMES:

Students will have a breadth and depth of skills and understanding in biotechnical skills and applications so as to have an immediate impact in the work force, and to be able to adapt to a rapidly evolving field.

12. WILL THE NEW OPTION BE OFFERED VIA DISTANCE DELIVERY? No.

13. MODE OF DELIVERY TO BE USED: Lecture, laboratory

14. EXPLAIN IN DETAIL THE DISTANCE DELIVERY PROCEDURES TO BE USED: N/A

15. IS THE DEGREE APPROVED FOR DISTANCE DELIVERY? No.

16. LIST COURSES IN EMPHASIS. INCLUDE COURSE DESCRIPTIONS FOR NEW COURSES.

See above.

17. SPECIFY THE AMOUNT OF THE ADDITIONAL COSTS REQUIRED, THE SOURCE OF FUNDS, AND HOW FUNDS WILL BE USED.

Funding will be required for hiring a non-tenure track full-time Instructor on a 12 month contract. Instructional duties include the teaching of the two Biotechniques lab courses, which will be offered every summer, and the "Introduction to Biotechnology" and "Biosafety and Ethics in Research" courses, which will be offered annually. Administrative duties include the advisement of students in this emphasis area. Salary: $55,000; Benefits: 13,750. All other required and elective courses are already being offered and taught by existing faculty. The increased enrollment in these lecture courses can be absorbed without additional cost.

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Equipment costs: $ 100,000 initially; $5,000 annually
Supply costs: $ 4,000 annually

The program must receive a portion of FTE funds as well as student fees (library, technology, infrastructure) as appropriate. The emphasis area will be able to accommodate 25 to 30 students per year. Individual tuition costs for the 36 academic hours are $7,488 (in-state) and $19,080 (out-of-state); fees generated are $1,792 per student. If the emphasis area enrolls only 15 students per year, total income per cohort generated from tuition and fees would range from $139,200 (all in-state students) to $313,280 (all out-of-state students). Based on inquiries anticipate that most students initially would be international students, so the higher estimate may be more realistic. Although the required biotechniques laboratory courses are highly specialized and expensive the increased enrollment supported by this program will offset their cost. A $100 lab fee per course would generate

$3,000 per summer with 15 students per course. The increased cost to the department can ultimately be borne by tuition and fee revenues generated by student enrollment, infrastructure fees for the replacement and purchase of new equipment, and laboratory fees for the biotechniques courses.