Academic Policy Series	1622.20A

ADD, CHANGE OR DELETE UNIT, PROGRAM REQUIREMENTS, OR ACADEMIC POLICIES

Complete this form consistent with the instructions in Academic Policy 1622.20. Use the form to add, change, or delete a program or unit or to change program policies. Proposed additions and changes must be consistent with Academic Policies 1100.40 and 1621.10 and any other policies which apply.

SECTION I: Approvals

Department / Program Chair	Date Submitted	Graduate Council Chair	Date
College Dean	Date	Faculty Senate Chair	Date
Honors College Dean	Date	Provost	Date
Core Curriculum Committee	Date	Board of Trustees Approval/Notification Date	
University Course and Programs Committee	Date	Arkansas Higher Education Coordinating Board Approval/Notification Date	

SECTION II: Profile Data - Required Information and Name Change Information

Academic Unit: ☒ Major/Field of Study ☐ Minor ☐ Other Unit _____ ☐ Policy

Level: ☐ Undergraduate ☒ Graduate ☐ Law Effective Catalog Year 2013

Program changes are effective with the next available catalog. See Academic Policy Series 1622.20

Current Name **M.S. in Biomedical Engineering (M.S.B.M.E.)**

College, School, Division **ENGR** Department Code **BMEG**

Current Code (6 digit Alpha) **BMENMS** Proposed Code (6 digit Alpha)
Prior approval from the Office of the Registrar is required.

☐ Interdisciplinary Program CIP Code **14.0301**
Prior assignment from Office of Institutional Research is required.

Proposed Name
When a program name is changed, enrollment of current students reflects the new name.

SECTION III: Add a New Program/Unit

__ For new program proposals, complete Sections II and VII and use as a cover sheet for a full program proposal as described in 'Criteria and Procedures for Preparing Proposals for New Programs in Arkansas.' ADHE
http://www.adhe.edu/divisions/academicaffairs/Pages/academicaffairs.aspx

☐ Program proposal uses courses offered by another academic college, and that college dean's office has been notified. The signature of the dean of that academic college is required here: _____
Fulbright College of Arts & Sciences

SECTION IV: Eliminate an Existing Program/Unit

Code/Name _____ Effective Catalog Year _____

No new students admitted to program after Term: ___ Year: _____
Allow students in program to complete under this program until Term: ___ Year: _____

SECTION V: Proposed Changes to an Existing Program or Program Policies

1. **Reduce the number of coursework hours required for the MS degree from 30 to 24. The credit required for thesis research will remain at 6 hours. The coursework reduction is consistent with other MS programs in the College of Engineering.**

   Old description:

   Thesis Option: 30 hours of graduate-level course work including 16 hours of core courses as identified below, plus 8 hours of courses from one of the specialty areas identified below, plus 6 hours of research resulting in a written Master's Thesis.

   New description:

   Thesis Option: 30 hours of graduate-level credit which includes: 24 hours of course work (including 12 hours of Biomedical Engineering Graduate Core), plus 6 hours of research resulting in a written Master's Thesis.

2. **Remove the 3-hour independent study and Master's report requirement from the MS degree (non-thesis option).**

   Old description:

   Non-Thesis Option: 33 hours of graduate-level course work including 16 hours of core courses as identified below, plus 14 hours from one of the specialty areas identified below, plus 3 hours of independent study resulting in a written Master's Report.

   New description:

   Non-Thesis Option: 30 hours of graduate-level course work including 12 hours of Biomedical Engineering Graduate Core.

3. **Modify graduate BMEG core to reflect department's vision:**

   Old BMEG core:
   - BENG 5203 Mathematical Modeling of Physiological Systems
   - BENG 5103 Advanced Instrumentation in Biological Engineering
   - BENG 5703 Design and Analysis of Experiments for Engineering Research or BENG 5223 Biomedical Engineering Research Internship
   - BENG 5801 Graduate Seminar
   - 6 hours of Advanced Science Courses chosen from the list below

     Advanced Science Courses:

     CHEM 5813
     CHEM 5843
     CHEM 6873
     CHEM 6883
     BIOL 5263
     BIOL 5334
     BIOL 5343
     BIOL 5423
     BIOL 5513
     KINS 5323
     KINS 5333
     KINS 5513
     KINS 5523
     KINS 5543
     KINS 6323

   New BMEG Core:
   - BMEG 5103 Design and Analysis of Experiments in Biomedical Research
   - BMEG 5203 Mathematical Modeling of Physiological Systems
   - BMEG 5504 Biomedical Microscopy
   - BMEG 5801 Graduate Seminar I
   - BMEG 5811 Graduate Seminar II

4. **Eliminate specialty area tracks in Bioimaging and Biosensing, Bioinformatics and Computational Biology, Tissue Engineering and Biomaterials, Bio-MEMS and Nano-Biotechnology. The following will be removed from the program and catalog:**

~~Specialty Areas and Approved Courses: Students are expected to select the required hours of graduate courses from one of the four following specialty areas and listing of approved courses. Other courses will be considered on petition to the student's graduate study committee and the Director and Department Head.~~

~~**Bioimaging and Biosensing:**~~
~~*Recommended Courses*~~
~~BENG 4123 Biosensors and Bioinstrumentation~~

~~*Elective Courses (one elective and two advanced science courses may come from the following)*~~
~~INEG 4533 Application of Machine Vision~~
~~CHEM 4213 Instrumental Analysis~~
~~CHEM 5223 Chemical Instrumentation~~
~~CHEM 5243 Electrochemical Methods of Analysis~~
~~CHEM 5253 Spectrochemical Methods of Analysis~~
~~ANAT 5203 Neurophysiology Recording Techniques (UAMS)~~
~~PHYO 5063 Molecular Biophysics (UAMS)~~
~~PHYO 510V Radiation Biology (UAMS)~~

~~**Bioinformatics and Computational Biology:**~~
~~*Recommended Courses*~~
~~BENG/CSCE 5213 Introduction to Bioinformatics~~
~~CSCE 5043 Advanced Artificial Intelligence~~

~~*Elective Courses (one elective and two advanced science courses may come from the following)*~~
~~BIOL 5263 Cell Physiology~~
~~BIOL 5334 Biochemical Genetics~~
~~CHEM 5813 Biochemistry I~~
~~CHEM 5843 Biochemistry II~~
~~MATH 4153 Mathematical Modeling~~
~~ANAT/MBIM/PATH/PHYO 5114 Gene Expression (UAMS)~~
~~BIOC 5103 Biochemistry and Molecular Biology (UAMS)~~
~~MBIM 5904 Genetics and Pathogenesis (UAMS)~~
~~PATH 5043 Molecular and Biochemical Pathology (UAMS)~~
~~PHYO 5063 Molecular Biophysics (UAMS)~~

~~**Tissue Engineering and Biomaterials:**~~
~~*Recommended Courses*~~
~~BENG 5233 Tissue Engineering~~
~~BENG 5243 Biomaterials~~

~~*Elective Courses (one elective and two advanced science courses may come from the following)*~~
~~BENG 4113 Risk Analysis for Biological Systems~~
~~CHEG 5013 Membrane Separation and System Design~~
~~CHEG 5513 Biochemical Engineering Fundamentals~~
~~MEEG 5303 Physical Metallurgy~~
~~MEEG 5393 Engineering Materials Topics~~
~~CHEM 5813 Biochemistry I~~
~~CHEM 5843 Biochemistry II~~
~~BIOL 4713 Basic Immunology~~
~~BIOL 5343 Advanced Immunology~~
~~KINS 5323 Biomechanics I~~
~~KINS 6323 Biomechanics II~~
~~ANAT 5026 Microscopic Anatomy (UAMS)~~
~~ANAT/MBIM/PATH/PHYO 5114 Gene Expression (UAMS)~~
~~PCOL 5033 General Principles of Pharmacology and Toxicology (UAMS)~~
~~PCOL 5063 Toxicology for Graduate Students (UAMS)~~
~~PHSC 5033 Pharmaceutics for Graduate Students (UAMS)~~
~~PHSC 517V Advanced Biopharmaceutics and Pharmacokinetics (UAMS)~~
~~PHYO 5063 Molecular Biophysics (UAMS)~~

~~PHYO 510V Radiation Biology (UAMS)~~

~~Bio-MEMS and Nano-Biotechnology:~~
~~*Recommended Courses*~~
~~BENG 5253 Bio-MEMS~~
~~MEPH 5713 Advanced Nanomaterials Chemistry~~

~~*Elective Courses (one elective and two advanced science courses may come from the following)*~~
~~MEEG 591V Nanomanufacturing: Materials and Processes~~
~~BIOL 5334 Biochemical Genetics~~
~~CHEM 5813 Biochemistry I~~
~~CHEM 5843 Biochemistry II~~
~~CHEM 6873 Molecular Biochemistry~~
~~PHYO 5063 Molecular Biophysics (UAMS)~~

5. **Eliminate Biomedical Engineering Breadth requirements. The following will be removed from the program and catalog:**

~~II. Biomedical Engineering Breadth Requirements (18 hours)~~
~~*Required Topics Recommended Courses*~~
~~Biomedical Engineering Principles 3~~
~~BENG 4203~~
~~Tissue Engineering 3~~
~~BENG 5233~~
~~Introduction to Bioinformatics 3~~
~~BENG 5213~~
~~Bio-MEMS 3~~
~~BENG 5253~~
~~Mathematical Modeling of Physiological Systems 3~~
~~BENG 5203~~
~~Transport Phenomena in Biological Systems 3~~
~~BENG 4733~~
~~Mechanical Design in Biological Systems 3~~
~~BENG 3803~~
~~Biosensors and Bioinstrumentation 3~~
~~BENG 4123~~
~~Electronic Instrumentation for Biol Systems 3~~
~~BENG 3103~~
~~Engineering Properties of Biological Materials 3~~
~~BENG 3712~~
~~Topics~~
~~Biomedical Control Systems 3~~
~~Reaction Kinetics 3~~
~~Signal/Image Processing 3~~
~~Control Systems/Theory 3~~
~~Biomedical Engineering Physiology 3~~
~~Engineering Statistics/Probability 3~~
~~Biomechanics 3~~

6. **Modify Basic Engineering Education requirements.**

Old Requirements:

I. Basic Engineering Education Requirements

General Education Recommended Courses	*Hours*
Humanities/social science	15
Acceptable to undergraduate program	
English composition	6
ENGL 1013 and 1023	
Mathematics and Basic Science Recommended Courses	
Calculus & differential equations	16
MATH 2554, MATH 2564, MATH 2574, & MATH 2584	

University Chemistry II CHEM 1123 & 1121L	4
University Physics (calculus based) PHYS 2054 & PHYS 2050L	4
General Microbiology BIOL 2013 & BIOL 2011L	4
Organic Chemistry I CHEM 3603 and CHEM 3601L	4
Introduction to Biochemistry CHEM 3813	3
Human Anatomy BIOL 2443 & BIOL2441L	4
Human Physiology BIOL 2213 & BIOL 2211L	4
Cell Biology BIOL 2533 & BIOL 2531L	4

Basic Engineering Topics Recommended Courses

Statics MEEG 2003	3
Mechanics of Materials MEEG 3013	3
Fluid Mechanics CHEG 2133 or MEEG 3503	3
Electric Circuits I ELEG 2104	3
Electronic Instrumentation for Biological Systems BENG 3104	3
Thermodynamics MEEG 2403 or CHEG 2313	3

New Requirements:

Basic Engineering Education Requirements: Prior to gaining admission into the M.S.B.M.E. program, students with a non-engineering degree or a non-ABET-accredited engineering degree must demonstrate completion of the following coursework with a GPA of at least 3.0: 15 hours of Humanities/Social Sciences, 6 hours of English Composition, 16 hours of Mathematics (including Calculus I, Calculus II, Calculus III and Differential Equations), 8 hours of University-level Biology, 8 hours of University-level Chemistry, 8 hours of University-level (calculus-based) Physics, and 15 hours of Basic Engineering Topics (selected from courses such as Biomechanics, Thermodynamics, Bioinstrumentation, Fluid Mechanics, Transport Phenomena and others). Students should consult the Graduate Coordinator for a complete list of courses that satisfy the Basic Engineering Topics criterion.

☐ Program change proposal adds courses offered by another academic college, and that college dean's office has been notified. The signature of the dean of that academic college is required here: _____

☐ Program change proposal deletes courses offered by another academic college, and that college dean's office has been notified. The signature of the dean of that academic college is required here: _____

Check all the boxes that apply and complete the required sections of the form:

☐ Change of Name and Code (Complete only sections I, II, V and VII.)

☒ Change Course Requirements: (Complete all sections of the form except "Proposed Name" in II, section III, and section IV.)

☐ Change Delivery Site/Method (Complete all sections of the form except "Proposed Name" in II, section III, and section IV.)

☒ Change Total Hours (Complete all sections of the form except "Proposed Name" in II, section III, and section IV.)

☐ Change in Program Policies

SECTION VI: Justification

Justify this change and state its likely effect on any other degree program (including those outside the school or college). Identify any program or program components (other than courses) to be eliminated if this program is implemented. (Program and course change forms must also be submitted for such related changes.)

The curriculum was modified to reflect the department's separation from Biological Engineering. The number of hours required was changed to harmonize with other departments within the college. Core courses were modified to reflect the department's vision as determined by the faculty.

SECTION VII: Catalog Text and Format

In the box below, insert the current catalog text which is to be changed, with changes highlighted with the color yellow. Include all proposed changes identified in Section V. Only changes explicitly stated in Section V will be considered for approval by the University Course and Programs Committee, the Graduate Council and the Faculty Senate. If you are proposing a new program, give proposed text with all of the elements listed below. If you are proposing modified text, include these elements as appropriate.

Include the following elements, in order, in the catalog text for proposed undergraduate program(s) or program changes:

- State complete major/program name
- Briefly define or describe the major/program or discipline.
- Identify typical career goals or paths for graduates. (Optional)
- State admission requirements (if any) for entry or entry into upper/advanced level of major/program.
- Identify location in catalog of university, college/school, and department/program requirements which the student must meet in addition to hours in the major, but do not restate these requirements.
- State course requirements in the major and any allied areas, giving number of hours and specific courses; specify electives or elective areas and give numbers of hours and courses in elective pools or categories; identify any other course requirements.
- State any other requirements (required GPA, internship, exit exam, project, thesis, etc.).
- Identify name and requirements for each concentration (if any).
- Specify whether a minor or other program component is allowed or required and provide details.
- State eight-semester plan requirements

For minors, state requirements in terms of hours, required courses, electives, etc.

For graduate program/units, include elements (as needed) parallel to those listed for undergraduate programs above.

For Law School program/units, prepare text consistent with current catalog style.

For centers, prepare text consistent with current catalog style.

I. Master of Science in Biomedical Engineering (M.S.B.M.E.)

Program Objectives: The objectives of the M.S.B.M.E. program are to prepare graduates for careers in biomedical engineering practice with government agencies, engineering firms, consulting firms or industries and to provide a foundation for continued study at the post-master's level.

Admission to Degree Program: Admission into the M.S.B.M.E. program is a two-step process. First, the prospective student must be admitted to graduate standing by the University of Arkansas Graduate School (see "The Graduate School: Objectives, Regulations, Degrees" in this catalog or visit http://grad.uark.edu/ for details). Second, the student must be admitted to the Department of Biomedical Engineering on the basis of academic transcripts, standardized test scores, 3 letters of recommendation and a statement of purpose. Students with a non-engineering degree or a non-ABET-accredited engineering degree must demonstrate completion of the Basic Engineering Education Requirements prior to being admitted. Complete details for admission may be obtained in the applicable program section from the BMEG Website at http://bmeg.uark.edu/ as well as in the BMEG graduate program handbook.

Requirements for M.S. Degree in Biomedical Engineering: Both Thesis and Non-Thesis Options are available for the M.S.B.M.E. degree. In general, students pursuing the Thesis Option are supported by research or teaching assistantships and conduct research under the guidance of a Major Adviser. Students pursuing the non-thesis options are typically not sponsored. For either option, all course work must be approved by the student's Program Advisory Committee. The cumulative grade-point average on all graduate courses presented for the degree must be at least 3.0. No more than six hours of special problems (individual study) courses may count toward the M.S.B.M.E. Complete details for degree requirements may be obtained in the applicable program section from the BMEG Website at http://bmeg.uark.edu/ as well as in the BMEG graduate program handbook. A general summary of degree requirements is given below:

Thesis Option: 24 hours of graduate-level course work, including 12 hours of Biomedical Engineering Graduate Core as identified below, plus 6 hours of research resulting in a written Master's Thesis. Candidates must pass a comprehensive final examination that will include an oral defense of the Master's Thesis. The examination is prepared and administered by the student's Master's Thesis committee.

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Non-Thesis Option: 30 hours of graduate-level course work including 12 hours of Biomedical Engineering Graduate Core as identified below.

Biomedical Engineering Graduate Core:

- BMEG 5103 Design and Analysis of Experiments in Biomedical Research
- BMEG 5203 Mathematical Modeling of Physiological Systems
- BMEG 5504 Biomedical Microscopy
- BMEG 5801 Graduate Seminar I
- BMEG 5811 Graduate Seminar II

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SECTION VIII: Action Recorded by Registrar's Office

PROGRAM INVENTORY/DARS

PGRM _____ SUBJ _____ CIP _____ CRTS _____

DGRE _____ PGCT _____ OFFC&CRTY VALID _____

REPORTING CODES

PROG. DEF. _____ REQ. DEF.

Initials ____ Date _____

Distribution

Notification to:
(1) College (2) Department (3) Admissions (4) Institutional Research (5) Continuing Education (6) Graduate School
(7) Treasurer (8) Undergraduate Program Committee

5/12/08