Date Submitted: 04/02/19 1:38 pm

Viewing: BMEGMS : Biomedical Engineering, Master of Science in Biomedical Engineering

Last approved: 04/26/18 1:03 pm

Last edit: 07/18/19 11:23 am

Changes proposed by: kbalacha

Catalog Pages Using this Program

Biomedical Engineering (BMEG)

Submitter: User ID: kbalacha Phone: 5-3376

Program Status Active

Academic Level Graduate

Type of proposal Major/Field of Study

Select a reason for this modification
Adding a Concentration or Option--(LON)

Are you adding a concentration? **Yes** ~~No~~

Concentration(s):

Action	Code	Title
Add new	**BMEG-HCEP**	**Healthcare Entrepreneurship**

Are you adding a track? No

Are you adding a focused study? No

Effective Catalog Year Fall 2020

College/School Code College of Engineering (ENGR)

Department Code Department of Biomedical Engineering (BMEG)

Program Code BMEGMS

Degree Master of Science in Biomedical Engineering

CIP Code

14.0501 ~~14.0301~~ - **Bioengineering and Biomedical Engineering.** ~~Agricultural Engineering.~~

Program Title

Biomedical Engineering, Master of Science in Biomedical Engineering

Program Delivery Method

In Workflow

1. **ENGR Dean Initial**
2. **GRAD Dean Initial**
3. **Provost Initial**
4. **Director of Program Assessment and Review**
5. **Registrar Initial**
6. **Institutional Research**
7. **BMEG Chair**
8. **ENGR Curriculum Committee**
9. **ENGR Faculty**
10. **WCOB Dean**
11. **EDUC Dean**
12. **ENGR Dean**
13. **Global Campus**
14. **Provost Review**
15. **University Course and Program Committee**
16. Graduate Committee
17. Faculty Senate
18. Provost Final
19. Provost's Office--Documentation sent to System Office
20. Higher Learning Commission
21. Board of Trustees
22. ADHE Final
23. Provost's Office--Notification of Approval
24. Registrar Final
25. Catalog Editor Final

Approval Path

1. 02/08/19 2:08 pm Norman Dennis (ndennis): Rollback to Initiator
2. 02/08/19 2:49 pm Norman Dennis

On Campus

Is this program interdisciplinary?

Yes

College(s)/School(s)

College/School Name
College of Engineering (ENGR)

Does this proposal impact any courses from another College/School?

Yes ~~No~~

College(s)/School(s)

College/School Name
Walton College of Business (WCOB)
College of Education and Health Professions (EDUC)

What are the total hours needed to complete the program? 30

Program Requirements and Description

Requirements

(ndennis): Rollback to Initiator

3. 02/08/19 8:55 pm Norman Dennis (ndennis): Approved for ENGR Dean Initial
4. 02/10/19 11:21 am Pat Koski (pkoski): Approved for GRAD Dean Initial
5. 02/12/19 11:01 am Alice Griffin (agriffin): Rollback to Initiator
6. 04/03/19 12:58 pm Norman Dennis (ndennis): Approved for ENGR Dean Initial
7. 04/03/19 1:01 pm Pat Koski (pkoski): Approved for GRAD Dean Initial
8. 04/04/19 10:41 am Terry Martin (tmartin): Approved for Provost Initial
9. 04/11/19 4:56 pm Alice Griffin (agriffin): Approved for Director of Program Assessment and Review
10. 06/05/19 7:45 pm Lisa Kulczak (lkulcza): Approved for Registrar Initial
11. 06/06/19 8:32 am Gary Gunderman (ggunderm): Approved for Institutional Research
12. 06/06/19 8:55 am Raj Rao (rajrao): Approved for BMEG Chair

13. 08/29/19 1:23 pm Manuel Rossetti (rossetti): Approved for ENGR Curriculum Committee
14. 08/29/19 1:25 pm Norman Dennis (ndennis): Approved for ENGR Faculty
15. 08/30/19 9:02 am Karen Boston (kboston): Approved for WCOB Dean
16. 09/10/19 8:07 am Ketevan Mamiseishvili (kmamisei): Approved for EDUC Dean
17. 09/10/19 10:16 am Norman Dennis (ndennis): Approved for ENGR Dean
18. 09/10/19 3:53 pm Suzanne Kenner (skenner): Approved for Global Campus
19. 09/10/19 4:08 pm Terry Martin (tmartin): Approved for Provost Review

History

1. Apr 26, 2018 by Kartik Balachandran (kbalacha)

Admission to Degree Program: Admission to the M.S.B.M.E. 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 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, three 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 Minimum Admission Criteria for non-Engineering Majors prior to being admitted. Complete details for admission may be obtained in the applicable program section from the Biomedical Engineering website as well as in the BMEG graduate program handbook. A general summary of admission requirements is given below:

A B.S. or M.S. degree in engineering or engineering equivalent or completion of the minimum admission criteria for non-engineering majors (see below) with a GPA of at least 3.0.

A GPA of 3.0 or higher on the last 60 hours of the baccalaureate degree.

A GRE score of 302 or above (verbal and quantitative).

A TOEFL score of at least 213 (computer-based) or 80 (internet based). This requirement is waived for applicants whose native language is English or who earn a bachelor's or master's degree from a U.S. institution.

A member of the faculty who is eligible (graduate status of group III or higher) must agree to serve as the Major Adviser to the prospective student.

Minimum Admission Criteria for non-Engineering Majors: 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: 3 courses in Mathematics (selected from Calculus I, Calculus II, Calculus III, Linear Algebra, and/or Differential Equations), 2 courses of University-level Biology, 2 courses of University-level Chemistry, and 2 courses of University-level (calculus-based) **Physics.** ~~Physics.In addition, students will be required to enroll and complete one of the following courses to provide adequate background in Engineering Design (BMEG2904 – Biomedical Instrumentation, BMEG3634 – Biomaterials, BMEG3124 – Biomedical Signals and Systems, or BMEG3824 – Biomolecular Engineering). Students should consult the Graduate Coordinator for a complete list of courses that satisfy the Minimum Admission Criteria.~~ **In addition, students will be required to enroll and complete one of the following courses to provide adequate background in Engineering Design (BMEG 2904 Biomedical Instrumentation, BMEG 3634 Biomaterials, BMEG 3124 Biomedical Signals and Systems, or BMEG 3824 Biomolecular Engineering. Students should consult the Graduate Coordinator for a complete list of courses that satisfy the Minimum Admission Criteria.**

Complete details for admission may be obtained in the applicable program section from the Biomedical Engineering website 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. A general summary of degree requirements is given below. More detailed information may be obtained from the Biomedical Engineering website as well as in the BMEG graduate program **handbook. Students should also be aware of Graduate School requirements with regard to master's degrees.** ~~handbook.~~

Biomedical Engineering Thesis Option: 24 hours of graduate-level course work, including 5 hours of Biomedical Engineering Graduate Core as identified below, at least **10 additional hours of graduate-level classes in Biomedical Engineering, and** 6 ~~additional hours of graduate-level classes in Biomedical Engineering, plus six~~ 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** ~~and~~ administered by the student's master's thesis **committee. All coursework must be at the 5000 level or above unless a request has been approved to use 4000-level courses for graduate credit.** ~~committee.~~

Biomedical Engineering Non-thesis Option: 30 hours of graduate-level course work including 5 hours of **Biomedical Engineering** ~~Biomedical Engineering~~ Graduate Core as identified below, ~~and~~ at least **10** ~~6~~ additional hours of graduate-level classes in **Biomedical Engineering. Candidates must pass a comprehensive written final examination.** ~~Biomedical Engineering.~~ **The examination is prepared and administered by the student's Program Advisory Committee (PAC). All coursework must be at the 5000 level or above unless a request has been approved to use 4000-level courses for graduate credit.**

Biomedical Engineering Graduate Core:

BMEG 5103	Design and Analysis of Experiments in Biomedical Research	3
BMEG 5801	Graduate Seminar I	1
BMEG 5811	Graduate Seminar II	1

Healthcare Entrepreneurship Concentration: 30 hours of graduate-level course work, including 5 hours of Biomedical Engineering Graduate Core classes identified above, 15 additional hours specific to the Healthcare Entrepreneurship Concentration as identified below, and 10 additional hours of graduate-level classes in Biomedical Engineering. Candidates must pass a comprehensive written final examination. The examination is prepared and administered by the student's Program Advisory Committee (PAC). All coursework must be at the 5000 level or above unless a request has been approved to use 4000-level courses for graduate credit.

Business and Management Fundamentals: MGMT 5213 Business Foundations for Entrepreneurs.

New Venture Development (The following courses have to be taken in one continuous block): MGMT 5323 New Venture Development (Fall); Strategic Management (MGMT 5313) (Spring); MGMT 5413 New Venture Development II (Spring).
Public Health Fundamentals (At least one course from below or another relevant course with PAC approval): PBHL 5213 Evaluation of Public Health Programs; PBHL 5533 Theories of Social and Behavioral Determinants of Health; PBHL 5563 Public Health: Practices and Planning
~~Students should also be aware of Graduate School requirements with regard to master's degrees .~~

Are Similar Programs available in the area?

No

Estimated Student Demand for Program	50
Scheduled Program Review Date	**2025-2026** ~~2018-2019~~

Program Goals and Objectives

Program Goals and Objectives
Program goals are broad general statements of what the program intends to accomplish and describes what a student will be able to do after completing the program. The program goals are linked to the mission of the university and the new strategic plan of the College of Engineering (COE).
Accordingly, the program goals of the MS and PhD programs in Biomedical Engineering at the University of Arkansas, Fayetteville are to produce graduates that are capable of:
1. Succeeding in practice at the interface between life science and engineering, or in other professional activities, or in post-master's or Ph.D. studies.
2. Utilizing their advanced engineering education in creating new knowledge or enabling technologies for improvement of human health and healthcare.
3. Continuously upgrading their knowledge in their chosen specialty by initiating self-directed learning.

Learning Outcomes

Learning Outcomes
Student Learning Outcomes are defined in terms of the knowledge, skills, and abilities that students will know and be able to do as a result of completing a program. These student learning outcomes are directly linked to the accomplishment of the program goals.
The graduates of the MS and PhD programs in Biomedical Engineering will either be capable of the following or possess the following attributes:
1. Conceiving, designing, analyzing, and implementing systems, processes and experiments related to improving human health and healthcare.
2. Functioning in multidisciplinary teams to find effective solutions to complex technical problems and/or the design of new products and processes to improve human health and health care.
3. Using modern analytical, simulation, and diagnostic tools and techniques used in healthcare industry.
4. In-depth and up-to-date knowledge within a specialized field in Biomedical Engineering.
5. An understanding of ethical and professional responsibility
6. To effectively communicate their findings/ideas to a technical and non-technical audience

Learning Outcomes
The prescribed outcomes of the MSBME are met through the curriculum followed by the students.

Description and justification of the request

Description of specific change	Justification for this change
Adding Healthcare Entrepreneurship Concentration within our BMEG MS Degree Program	Adding new concentration.
Changing BMEGMS CIP code	BMEGMS is still coded as 14.0301 (Agricultural Engineering). We would like to code it to 14.0501 (Biomedical Engineering).
Streamlining language within all our various tracks.	To streamline language in our various BMEG options/concentrations with the addition of this new concentration to have at least 15 hours of Engineering classes in all the MSBMEG degree options/concentrations.

Upload attachments
BMEGMS - CIP Code Change - Ltr of Notification.pdf
BMEGMS - CIP Code Change -Curriculum.docx

Reviewer Comments
Norman Dennis (ndennis) (02/08/19 2:08 pm): Rollback: Per request of you department head
Norman Dennis (ndennis) (02/08/19 2:49 pm): Rollback: You also need to describe your current program in BMEG which will also be a track (give it a name)
Alice Griffin (agriffin) (02/12/19 10:50 am): Hyperlinked courses throughout program requirements to make sure they match course inventory.
Alice Griffin (agriffin) (02/12/19 10:50 am): Also, updated scheduled program review date.
Alice Griffin (agriffin) (02/12/19 11:01 am): Rollback: Changing the CIP Code is considered a major change. Please complete the LON form and change the reason for the modification.
Norman Dennis (ndennis) (04/03/19 12:19 pm): Change track to concentration
Norman Dennis (ndennis) (04/03/19 12:58 pm): Added before and after curriculum document
Alice Griffin (agriffin) (04/10/19 8:33 am): Changed the term track to concentration within the Healthcare Entrepreneurship Concentration paragraph within program requirements field. College is encouraged to review that section and verify the correct language is being used.
Alice Griffin (agriffin) (04/10/19 8:46 am): Revised curriculum document to match formatting for BOT materials. Changed degree code and degree in LON to match ADHE degree code and degree.
Alice Griffin (agriffin) (04/11/19 4:54 pm): Entered the concentration program code with input from department.
Lisa Kulczak (lkulcza) (06/05/19 7:42 pm): Adjusted effective date from fall 2019 to fall 2020.
Gary Gunderman (ggunderm) (06/06/19 8:32 am): CIP Code change is appropriate.
Norman Dennis (ndennis) (07/18/19 11:23 am): Removed the ability to use 3000 level courses for graduate credit, even if approved by the advisory committee.

Key: 283