

Date Submitted: 02/17/21 9:14 pm

Viewing: **BMEGBS : Biomedical Engineering, Bachelor of Science in Biomedical Engineering**

Last approved: 05/26/20 4:36 pm

Last edit: 02/18/21 4:04 pm

Changes proposed by: jwolchok

Catalog Pages Using this Program

- [Biomedical Engineering B.S.Bm.E.](#)
- [Biomedical Engineering.\(BMEG\)](#)

Submitter: **575-2850 7456** User ID: **jwolchok Hkuteza** Phone:

Program Status Active

Academic Level Undergraduate

Type of proposal Major/Field of Study

Select a reason for this modification

Making Minor Changes to an Existing Degree (e.g. changing 15 or fewer hours, changing admission/graduation requirements, adding/changing Focused Study or Track)

Are you adding a concentration?
No

Are you adding or modifying a track?
No

Are you adding or modifying a focused study?
No

Effective Catalog Year Fall 2021

College/School Code
College of Engineering (ENGR)

In Workflow

1. ENGR Dean Initial
2. Director of Program Assessment and Review
3. Registrar Initial
4. Institutional Research
5. BMEG Chair
6. ENGR Curriculum Committee
7. ENGR Faculty
8. ARSC Dean
9. ENGR Dean
10. Global Campus
11. Provost Review
12. University Course and Program Committee
13. Faculty Senate
14. Provost Final
15. Provost's Office-- Notification of Approval
16. Registrar Final
17. Catalog Editor Final

Approval Path

1. 02/18/21 10:38 am Norman Dennis (ndennis): Approved for ENGR Dean Initial
2. 02/18/21 11:33 am Alice Griffin (agriffin): Approved for Director of

Department Code

Department of Biomedical Engineering (BMEG)

Program Code

BMEGBS

Degree

Bachelor of Science in Biomedical Engineering

CIP Code

Program

Assessment and
Review

3. 02/18/21 3:10 pm

Lisa Kulczak

(lkulcza): Approved
for Registrar Initial

4. 02/18/21 4:04 pm

Gary Gunderman

(ggunderm):

Approved for

Institutional

Research

5. 02/18/21 4:29 pm

Raj Rao (rajrao):

Approved for BMEG
Chair

6. 02/18/21 4:31 pm

Manuel Rossetti

(rossetti): Approved
for ENGR

Curriculum

Committee

7. 02/18/21 4:32 pm

Norman Dennis

(ndennis): Approved
for ENGR Faculty

8. 02/18/21 7:48 pm

Jeannie Hulen

(jhulen): Approved

for ARSC Dean

9. 02/18/21 7:49 pm

Norman Dennis

(ndennis): Approved
for ENGR Dean

10. 02/19/21 8:35 am

Suzanne Kenner

(skenner): Approved
for Global Campus

11. 02/19/21 9:30 am
Terry Martin
(tmartin): Approved
for Provost Review

History

- 1. Aug 15, 2014 by Leepfrog Administrator (clhelp)
- 2. Apr 21, 2015 by Stacy Sanchez (slperry)
- 3. Mar 8, 2016 by Charlie Alison (calison)
- 4. May 25, 2017 by Charlie Alison (calison)
- 5. Apr 26, 2018 by Michelle Kim (mmkim)
- 6. May 26, 2020 by Lisa Kulczak (lkulcza)

14.0501 - Bioengineering and Biomedical Engineering.

Program Title

Biomedical Engineering, Bachelor of Science in Biomedical Engineering

Program Delivery

Method

On Campus

Is this program interdisciplinary?

No

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

Yes

College(s)/School(s)

| College/School Name |
|-----------------------------------------------|
| Fulbright College of Arts and Sciences (ARSC) |

What are the total 128
hours needed to
complete the
program?

Program Requirements and Description

Requirements

Technical Options in Biomedical Engineering

Each student in biomedical engineering is required to complete nine semester hours of biomedical engineering technical electives. Biomedical engineering technical elective courses must be selected from a faculty-approved list of courses found in the department's Undergraduate Advising Handbook, which is available on the [department's website](#). Elective courses are chosen with the aid of an academic adviser to better prepare for employment or further study in areas such as:

Bioengineering

Pharmaceutical manufacturing or pharmacology

Biomedical device design

Medicine

Business

Law

Technical Elective Course

Each student in biomedical engineering is required to complete three semester hours of upper level science electives. Upper level (3000 and above) science electives will be chosen from courses in mathematics, engineering, and the sciences with the approval of their adviser. The department maintains a list of approved upper level science electives that may be found in the department's Undergraduate Advising Handbook, which is available on the [department's website](#).

8-Semester Plan

Biomedical Engineering B.S.Bm.E.

Eight-Semester Degree Program

The following section contains the list of courses required for the Bachelor of Science in Biomedical Engineering degree and a suggested sequence for students who enter the College through the Freshman Engineering Program. Not all courses are offered every semester, so students who deviate from the suggested sequence must pay careful attention to course scheduling and course prerequisites. Students wishing to follow

sequence must pay careful attention to course scheduling and course prerequisites. Students wishing to follow the eight-semester degree plan should see the [Eight-Semester Degree Policy](#) in the Academic Regulations chapter for university requirements of the program.

| First Year | Units |
|-----------------------------------------------------------------------------------------------------------------------------|----------------|
| | FallSpring |
| ENGL 1013 Composition I (ACTS Equivalency = ENGL 1013) (Satisfies General Education Outcome 1.1) | 3 |
| MATH 2554 Calculus I (ACTS Equivalency = MATH 2405) (Satisfies General Education Outcome 2.1) | 4 |
| PHYS 2054 University Physics I (ACTS Equivalency = PHYS 2034) (with lab) | 4 - |
| CHEM 1103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture) | 3 |
| GNEG 1111 Introduction to Engineering I | 1 |
| Select one of the following to satisfy General Education Outcome 4.2: | |
| HIST 2003 History of the American People to 1877 (ACTS Equivalency = HIST 2113) | 3 |
| or HIST 2013 History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123) | |
| or PLSC 2003 American National Government (ACTS Equivalency = PLSC 2003) | |
| ENGL 1023 Composition II (ACTS Equivalency = ENGL 1023) | - 3 |
| ENGL 1033 Technical Composition II (ACTS Equivalency = ENGL 1023) (Satisfies General Education Outcome 1.2) | 3 |
| Freshman Science Elective with lab2 | 4 |
| MATH 2564 Calculus II (ACTS Equivalency = MATH 2505) | 4 |
| HIST 2003 History of the American People to 1877 (ACTS Equivalency = HIST 2113) | - 3 |
| or HIST 2013 History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123) | |
| or PLSC 2003 American National Government (ACTS Equivalency = PLSC 2003) | |
| PHYS 2054 University Physics I (ACTS Equivalency = PHYS 2034) | 4 |
| GNEG 1121 Introduction to Engineering II | 1 |
| Year Total: | 14 16 |

| Second Year | Units |
|--------------------------------------------------------------------------------------------------|----------------|
| | FallSpring |
| Sophomore Science Elective with lab3 | 4 |
| BMEG 2614 Introduction to Biomedical Engineering | 4 |
| MATH 3083 Linear Algebra | 3 |
| Satisfies General Education Outcome 3.4: | |
| BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) | 4 |
| & BIOL 1541L Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab) | |
| BMEG 2813 Biomechanical Engineering | 3 |
| BMEG 2904 Biomedical Instrumentation (with Lab) | 4 |
| MATH 2584 Elementary Differential Equations | 4 |
| BIOL 2533 Cell Biology | 3 |
| Fine Arts Elective (from Univ/State Core List) | - 3 |
| Fine Arts State Minimum Core Elective (Satisfies General Education Outcome 3.1) | 3 |

| | |
|--------------------------------------------------------------------------------------------------------|----------------|
| Year Total: | 15 17 |
| Third Year | Units |
| | FallSpring |
| <u>BMEG 3634</u> Biomaterials (with lab) | 4 |
| <u>BMEG 3124</u> Biomedical Signals and Systems (with lab) | 4 |
| <u>CHEG 2313</u> Thermodynamics of Single-Component Systems or <u>MEEG 2403</u> Thermodynamics | 3 |
| <u>CHEM 3603</u> Organic Chemistry I | 4 |
| & <u>CHEM 3601L</u> Organic Chemistry I Laboratory | |
| Social Science Elective (from Univ/State Core List) | 3 - |
| Social Sciences State Minimum Core Elective (Satisfies General Education Outcomes 3.3 and 4.1)5 | 3 |
| <u>BMEG 3653</u> Biomedical Modeling and Numerical Methods | 3 |
| <u>BMEG 3824</u> Biomolecular Engineering (with lab) | 4 |
| <u>BMEG 3801</u> Clinical Observations and Needs Finding | 1 |
| <u>CHEG 2133</u> Fluid Mechanics | 3 |
| or <u>MEEG 3503</u> Mechanics of Fluids | |
| <u>BIOL 2213</u> Human Physiology (ACTS Equivalency = BIOL 2414 Lecture) | 4 |
| & <u>BIOL 2211L</u> Human Physiology Laboratory (ACTS Equivalency = BIOL 2414 Lab) | |
| <u>STAT 2823</u> Biostatistics | 3 |
| Year Total: | 18 18 |
| Fourth Year | Units |
| | FallSpring |
| <u>BMEG 4813</u> Biomedical Engineering Design I | 3 |
| <u>BMEG 4623</u> Biomedical Transport Phenomena | 3 |
| BMEG Elective | 3 |
| Science Elective | 3 |
| Social Science Elective (from Univ/State Core List) | 3 - |
| Social Sciences State Minimum Core Elective (Satisfies General Education Outcome 3.3)6 | 3 |
| <u>BMEG 4823</u> Biomedical Engineering Design II (Satisfies General Education Outcome 6.1) | 3 |
| BMEG Elective | 3 |
| BMEG Elective | 3 |
| Social Science Elective (from Univ/State Core List) | - 3 |
| Humanities Elective (from Univ/State Core List) | - 3 |
| Social Sciences State Minimum Core Elective (Satisfies General Education Outcome 3.3)6 | 3 |
| Humanities State Minimum Core Elective (Satisfies General Education Outcomes 3.2 and 5.1)7 | 3 |
| Year Total: | 15 15 |
| Total Units in Sequence: | 128 |

* ~~The Freshman Science Elective must be chosen from either CHEM 1123/CHEM 1121L or PHYS 2074.~~

~~**The Sophomore Science Elective must be either PHYS 2074 or CHEM 1123/CHEM 1121L. (Whichever was not chosen as the Freshman Engineering Science Elective):~~

- 1 Students have demonstrated successful completion of the learning indicators identified for learning outcome 2.1, by meeting the prerequisites for MATH 2554.
- 2 The Freshman Science Elective must be chosen from either CHEM 1123/CHEM 1121L or PHYS 2074.
- 3 The Sophomore Science Elective must be either PHYS 2074 or CHEM 1123/CHEM 1121L. (Whichever was not chosen as the Freshman Engineering Science Elective).
- 4 The Fine Arts Elective courses which satisfy General Education Outcome 3.1 include: ARCH 1003, ARHS 1003, COMM 1003, DANC 1003, LARC 1003, MLIT 1003, MLIT 1003H, MLIT 1013, MLIT 1013H, MLIT 1333, THTR 1003, THTR 1013, or THTR 1013H.
- 5 The Social Sciences Elective courses which satisfy General Education Outcomes 3.3 and 4.1 include: ANTH 1023, COMM 1023, HDFS 1403, HDFS 2413, HIST 1113, HIST 1123, HIST 2093, HUMN 1114H, HUMN 2114H, INST 2013, INST 2813, INST 2813H, PLSC 2013, PLSC 2813, PLSC 2813H, RESM 2853, SOCI 2013, SOCI 2013H, or SOCI 2033.
- 6 The Social Sciences Elective courses which satisfy General Education Outcome 3.3 include: AGEC 1103, AGEC 2103, ANTH 1023, COMM 1023, ECON 2013, ECON 2023, ECON 2143, EDST 2003, HDFS 1403, HDFS 2413, HDFS 2603, HIST 1113, HIST 1113H, HIST 1123, HIST 1123H, HIST 2003, HIST 2013, HIST 2093, HUMN 1114H, HUMN 2114H, INST 2013, INST 2813, INST 2813H, PLSC 2003, PLSC 2013, PLSC 2203, PLSC 2813, PLSC 2813H, PSYC 2003, RESM 2853, SOCI 2013, SOCI 2013H, or SOCI 2033. Note, courses cannot be counted twice in degree requirements.
- 7 The Humanities Elective courses which satisfy General Education Outcomes 3.2 and 5.1 include: CLST 1003, CLST 1003H, CLST 1013, HUMN 1124H, PHIL 2003, PHIL 2003C, PHIL 2003H, PHIL 2103, or PHIL 2103C.

Are Similar Programs available in the area?

No

Estimated Student Demand for Program 60 per year

Scheduled Program **2025-2026** ~~2018-~~

Review Date **2019**

Program Goals and Objectives

Program Goals and Objectives

Program Goals and Objectives

The Program Education Objectives of the undergraduate BMEG program 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-baccalaureate studies.
2. Utilizing their engineering education/experience in creating new knowledge or enabling technologies for improvement of human health and healthcare.
3. Conducting themselves with high standards of professional ethics and integrity
4. Being aware of the limits of their knowledge and initiate self-directed learning to create future professional opportunities for themselves in biomedical engineering.

unchanged

Learning Outcomes

Learning Outcomes

Completion of the degree requirements provides for the following educational outcomes:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

These educational outcomes are experienced within the context of biology and physiology appropriate to solving problems at the interface of engineering and biology. ~~Please remove all references to CHEM 1113 and CHEM 1133/31L from the Program change language. This includes footnotes that directly result from the courses being offered to students in place of CHEM 1103 and CHEM 1123/21L. (The coded box above does not allow me to edit with any confidence, so please see attached file.)~~

Description and justification of the request

| Description of specific change | Justification for this change |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Revised formatting of the eight semester degree plan. Inserted General Education language. Also added footnotes and hyper-linked courses for access to course details.</p> <p>moved Physics II and State Core History to satisfy new FEP requirements</p> | <p>To provide consistency with the General Education curriculum language. Footnotes provides list of courses that specifically meets each General Education Outcome on behalf of the college.</p> <p>Changes to ENGL 1033 requirement will need program change to receive campus approval. AG</p> |

Upload attachments

Reviewer Comments

Norman Dennis (ndennis) (02/18/21 10:37 am): Removed the statement requiring 40 hours of 3000-4000 level courses

Alice Griffin (agriffin) (02/18/21 11:02 am): Revised the schedule program review date.

Alice Griffin (agriffin) (02/18/21 11:14 am): The following statement was entered into the Learning Outcomes field. Placing it hear to reflect the comment from one of the reviewers: Please remove all references to CHEM 1113 and CHEM 1133/31L from the Program change language. This includes footnotes that directly result from the courses being offered to students in place of CHEM 1103 and CHEM 1123/21L. (The coded box above does not allow me to edit with any confidence, so please see attached file.)

Alice Griffin (agriffin) (02/18/21 11:23 am): Inserted program goals and learning outcomes from handbook. College is encouraged to review for currency.

Alice Griffin (agriffin) (02/18/21 11:30 am): Entered language for learning outcome 6.1 for BMEG 4823, pending final approval of course change.

Gary Gunderman (ggunderm) (02/18/21 4:04 pm): 14.0501 CIP approved.

Key: 473