

Date Submitted: 11/15/23 4:01 pm

Viewing: **BENGMS : Biological Engineering, Master of Science in Biological Engineering**

Last approved: 04/26/18 1:01 pm

Last edit: 01/01/24 2:29 pm

Changes proposed by: jwkim

Catalog Pages Using
this Program

[Biological and Agricultural Engineering \(BAEG\)](#)

Submitter: User ID: [jwkim calison](#) Phone:
[575-3402 575-6731](#)

Program Status Active

Academic Level Graduate

Type of proposal Major/Field of Study

Select a reason for this modification

Revising Curriculum of an Existing Certificate or Degree (making a net change of more than 15 credit hours)--(LON)

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 08152024

College/School Code

College of Engineering (ENGR)

Department Code

Department of Biological and Agricultural Engineering (BAEG)

In Workflow

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

Approval Path

1. 09/12/23 9:35 am
Kevin Hall (kdhall):

Program Code BENGMS
 Degree Master of Science in Biological Engineering
 CIP Code

- Approved for ENGR
 Dean Initial
2. 09/15/23 2:46 pm
 Ed Bengtson
 (egbengts):
 Approved for GRAD
 Dean Initial
 3. 10/09/23 5:31 pm
 Lisa Kulczak
 (lkulcza): Rollback to
 Initiator
 4. 10/31/23 4:05 pm
 Kevin Hall (kdhall):
 Rollback to Initiator
 5. 11/03/23 2:37 pm
 Kevin Hall (kdhall):
 Approved for ENGR
 Dean Initial
 6. 11/13/23 11:22 am
 Ed Bengtson
 (egbengts): Rollback
 to ENGR Dean Initial
 for GRAD Dean
 Initial
 7. 11/15/23 3:38 pm
 Kevin Hall (kdhall):
 Rollback to Initiator
 8. 11/17/23 8:38 am
 Kevin Hall (kdhall):
 Approved for ENGR
 Dean Initial
 9. 11/20/23 8:54 am
 Ed Bengtson
 (egbengts):
 Approved for GRAD
 Dean Initial
 10. 11/20/23 10:21 am
 Jim Gigantino
 (jgiganti): Rollback
 to GRAD Dean Initial
 for Provost Initial

11. 11/21/23 9:59 am
Ed Bengtson
(egbengts):
Approved for GRAD
Dean Initial
12. 11/21/23 10:44 am
Jim Gigantino
(jgiganti): Approved
for Provost Initial
13. 12/21/23 5:14 pm
Lisa Kulczak
(lkulcza): Approved
for Director of
Curriculum Review
and Program
Assessment
14. 01/01/24 2:29 pm
Gina Daugherty
(gdaugher):
Approved for
Registrar Initial
15. 01/02/24 10:26 am
Doug Miles
(dmiles): Approved
for Institutional
Research
16. 01/02/24 1:13 pm
Terry Howell Jr
(tahowell):
Approved for BAEG
Chair
17. 01/22/24 12:33 pm
Manuel Rossetti
(rossetti): Approved
for ENGR
Curriculum
Committee
18. 01/24/24 9:16 am
Kevin Hall (kdhall):
Approved for ENGR
Faculty

- 19. 01/24/24 9:16 am
Kevin Hall (kdhall):
Approved for ENGR
Dean
- 20. 01/24/24 9:17 am
Suzanne Kenner
(skenner): Approved
for Global Campus
- 21. 01/24/24 9:30 am
Matthew Ganio
(msganio):
Approved for
Provost Review
- 22. 02/16/24 8:16 am
Ed Bengtson
(egbengts):
Approved for
Graduate Council

History

- 1. Apr 5, 2017 by
Charlie Alison
(calison)
- 2. May 24, 2017 by
Charlie Alison
(calison)
- 3. Apr 26, 2018 by
Linda Pate (lpate)

14.4501 ~~14.0301~~ - Biological/Biosystems ~~Agricultural~~ Engineering.

Program Title

Biological Engineering, Master of Science in Biological Engineering

Program Delivery

Method

On Campus

Is this program interdisciplinary?

No

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

No

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

Program Requirements and Description

Requirements

Admission to the Degree Program: Admission to the Biological Engineering graduate program is a three-step process. First, the prospective student must be admitted to graduate standing by the University of Arkansas Graduate School. Second, the student must be accepted into the department's program ~~program, which depends on the basis of academic transcripts, three letters of recommendation, recommendations,~~ a statement of purpose, a resume, and standardized test scores. Students with a non-engineering degree or a non-ABET accredited engineering degree must complete the minimum deficiency coursework for non-engineering majors. ~~the following additional requirements:~~ A general summary of admission requirements is given below:

~~Students with an ABET-accredited or equivalent Engineering Degree~~ Students seeking admission to an M.S. program from a B.S. degree in engineering: A score on the Graduate Record Examination (GRE) to meet the Graduate School requirement of a standardized exam. ~~For students whose first language is not English, a demonstration of English language proficiency which meets the requirements of the Graduate School.~~ GPA of 3.00 or higher on the last 60 hours of a B.S. degree or B.S. and/or M.S. degrees. ~~B.S. degree in engineering from an ABET accredited program or equivalent.~~

equivalent: GPA of 3.00 or higher on the last 60 hours of a B.S. degree.

~~Students with an Engineering Degree~~ Students to an M.S. program from a non-

engineering B.S. degree: Competitive scores of ~~A score on the~~ Graduate Record Examination (GRE) to meet the Graduate School requirement of a standardized exam:

Students ~~For students~~ whose first language is not English must demonstrate ~~English, a demonstration of~~ English language proficiency as required by ~~which meets~~ the requirements of the Graduate School. GPA of 3.00 or higher on the last 60 hours of a B.S. degree. Completion of 18 hours of engineering coursework. See <https://international-admissions.uark.edu/graduate-studies/english-proficiency.php>

Finally, a member of the faculty who is eligible (graduate status of group III ~~H~~ or higher) must agree to serve as the major adviser to the prospective student.

Detailed requirements are in the Biological and Agricultural Engineering Department Graduate Student Handbook, available at bio-ag-engineering.uark.edu.

baeg.uark.edu:

Requirements for the Master of Science Degree: (Minimum 30 hours) Both thesis ~~hours~~) In addition to the requirements of the Graduate School and non-thesis options are available ~~the graduate faculty in Engineering, the following departmental requirements must be satisfied~~ for the M.S.B.E. degree. In general, pursuing the thesis option is supported by research or teaching assistantships and conducting research under the guidance of a major advisor. Students pursuing the non-thesis options are typically not sponsored. For either option, all coursework must be approved by the student's program advisory committee. Students with a non-engineering degree or a non-

ABET accredited engineering degree must complete the minimum deficiency coursework for non-engineering majors (see below). B.S. A general summary of degree requirements is given below. Detailed requirements may be obtained from the ~~are in the~~ Biological and Agricultural Engineering Department Graduate Student Handbook, available at bio-ag-engineering.uark.edu. ~~at bio-ag-engineering.uark.edu~~. Students should also be aware of Graduate School requirements with regard to M.S. ~~master's degrees~~: [degree \(catalog.uark.edu\)](http://catalog.uark.edu).

M.S.B.E. degree: Students with an engineering B.S. degree: Thesis Option: A minimum of ~~All students are required to complete not less than~~ 24 semester hours of ~~acceptable~~ course ~~credit is required beyond~~ ~~work acceptable to~~ the ~~B.S. committee and a minimum of six semester hours of thesis. Of the 24 hours required for the M.S. Degree plus 6 semester hours of BENG 6000V Master's Thesis. Except for those enrolled in the accelerated M.S.B.E. program, courses taken prior to acceptance for graduate study cannot be used to meet this requirement. The following describes the general requirement of M.S.B.E. Thesis Option:~~

Complete not less ~~degree, no more~~ than ~~24~~ 12 semester hours of ~~coursework and a minimum of 6 semester hours of thesis (BENG 6000V). Of ~~course work presented for~~ the ~~24 hours required for MS degree can be at~~ the ~~M.S. 4000 level~~. ~~degree, no more than 12 semester hours of coursework presented for the MS degree can be at the 4000 level. All 4000-level courses used toward the M.S. degree must be approved by the Graduate School. All students should meet the following requirements:~~~~

- i. At least one advanced mathematics or statistics course.
- i. 1 hour of BENG 58001 Graduate Seminar.
- .. ~~Students with a non-engineering B.S. degree: At least 9 hours of formal coursework at ~~in addition to~~ the 5000 level or higher (excluding Thesis and Seminar) ~~requirement~~ in Biological Engineering (BENG). This ~~1, students must complete 18 hours of deficiency engineering~~ course work ~~will need to include two of the three following courses: to demonstrate engineering competence: BENG 51003 Advanced Instrumentation in Biological Engineering, BENG 56103 Simulation Modeling of Biological Systems, and BENG 57003 Design and Analysis of Experiments for Engineering Research.~~~~
- i. At least 6 hours of BENG 6000V Master's Thesis.

Earn a minimum cumulative grade-point average of 3.0 on all graduate courses attempted. The minimum acceptable grade on a graduate course is "C."

~~Prior to acceptance into the program a candidate must, in consultation with the department head, identify a professor who is willing to serve as the major professor. Select. During the first semester, the candidate must, in consultation with the major advisor, Program Advisory Committee ~~professor~~ and prepare, in consultation with the committee, department head, select a written Program of Study within the first semester. ~~graduate committee: The candidate will, in consultation with the committee, prepare a written graduate program of study that will achieve the candidate's objectives.~~ Satisfactorily pass a written thesis research proposal at least one semester before completing ~~before completing~~ all other requirements.~~

~~Students may retake a failed proposal defense once, contingent upon approval of the student's advisory committee. A student who fails the proposal defense twice will be terminated from the program.~~ Satisfactorily pass a final oral examination and complete and submit a thesis.

Prepare ~~Candidates must prepare~~ a paper suitable for submission as to a refereed article journal from research done for a thesis. It is not required that the paper be submitted for publication, but it must be prepared and approved by the major professor.

Complete Exit Review.

M.S.B.E. Non-thesis Option: A minimum of 30 hours of acceptable course credit is required beyond the B.S. Degree and should include 3 semester hours of technical project and report. Except for those enrolled in the accelerated M.S.B.E. program, courses taken prior to acceptance for graduate study cannot be used to meet this requirement. Complete not less than 30 semester hours of coursework acceptable to the committee that includes 3 semester hours of technical project and report (BENG 5000V). No more than 12 semester hours of coursework presented for the MS degree can be at the 4000 level. All 4000-level courses used toward the M.S. degree must be approved by the Graduate School. All students should meet the following requirements:

1. At least one advanced mathematics or statistics course.
 1. 1 hour of BENG 58001 Graduate Seminar.
 2. At least 9 hours of formal coursework at the 5000 level or higher (excluding Technical Project and Report, and Seminar) in Biological Engineering (BENG). This coursework will need to include two of the three following courses: BENG 51003 Advanced Instrumentation in Biological Engineering, BENG 56103 Simulation Modeling of Biological Systems, and BENG 57003 Design and Analysis of Experiments for Engineering Research.
 1. At least 3 hours of BENG 5000V Advanced Topics in Biological Engineering.
- Earn a minimum cumulative grade-point average of 3.0 on all graduate courses attempted. The minimum acceptable grade on a graduate course is "C."

Complete Exit Review.

Deficiency Course Requirement for Students with non-Engineering Degree: Prior to completing the above-listed M.S. degree requirements, students admitted to the M.S.B.E. program without an ABET-accredited or equivalent engineering degree must demonstrate engineering competence by passing 18 hours of the following deficiency engineering course work. The deficiency coursework does not count toward the course requirements of the M.S.B.E. degree. The required deficiency courses are:

A minimum of 15 credit hours of 2000 level or above of engineering courses (with course prefix BENG, BMEG, CHEG, CVEG, CENG, ELEG, INEG, or MEEG) currently allowed for credit within the BENG undergraduate program. Minimum of 3 credit hours of one of the following BENG courses: BENG 36503 Global Bio-Energy Engineering, BENG 47403 Food and Bio-Product Systems Engineering, BENG 49303 Sustainable Watershed Engineering, or BENG 46603 Sustainable Biosystems Designs.

Specific deficiency courses are to be determined in consultation with the student's major advisor and advisory committee. Please note that courses in addition to those listed above may be required for students without required prerequisites for the deficiency courses (such as life sciences and/or math/physics/chemistry prerequisite courses).

Accelerated M.S.B.E. Degree

High-achieving undergraduate students seeking a Bachelor of Science degree in biological engineering (B.S.B.E.) at the University of Arkansas, who choose to pursue graduate studies in biological engineering (BENG), may participate in the accelerated Master of Science program in BENG (M.S.B.E.). Eligible B.S.B.E. students can count up to 12 credit hours of BENG or science elective courses towards their M.S.B.E. degree. The 12 credit hours must be from the courses that satisfy the M.S.B.E. degree requirements and must be taken during the final 12-month period of their undergraduate degree on the Fayetteville campus of the University of Arkansas. They may include a maximum of 6 hours of 4000-level courses, but the remaining hours must be that of 5000-level courses. All 4000-level courses used toward the M.S. degree must be approved by the Graduate School.

The degree requirements of the accelerated M.S.B.E. program are identical to those of the M.S.B.E. program (thesis and non-thesis options). Students must complete either at least 24 hours of coursework and at least 6 hours of BENG 6000V Master's Thesis (thesis option) or at least 27 hours of coursework and at least 3 hours of BENG 5000V Advanced Topics in Biological Engineering (non-thesis option). The coursework hours (24 or 27 hours) include up to 12 hours transferred from the B.S.B.E. degree.

Biological engineering undergraduate students interested in the accelerated M.S.B.E. degree should apply to the program prior to starting the second-to-last semester of their undergraduate program. To be eligible, students must have a 3.5 cumulative GPA or higher, and submit the normal application materials required by the graduate school for the M.S.B.E. degree program. For students that have a cumulative GPA of 3.5 or higher, the submission of GRE score is waived.

Detailed requirements may be obtained from the Biological and Agricultural Engineering Department Graduate Student Handbook, available at bio-ag-engineering.uark.edu. Students should also be aware of Graduate School requirements with regard to M.S. degrees (catalog.uark.edu).

~~Detailed requirements are in the Biological and Agricultural Engineering Department Graduate Student Handbook, available at bio-ag-engineering.uark.edu. 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 NA

Demand for Program

Scheduled Program 2026-2027 ~~2018-~~

Review Date ~~2019~~

Program Goals and Objectives

Program Goals and Objectives

1. Prepare students to contribute new knowledge for significant applications of fundamental or applied importance in and contributions to Biological Engineering.

~~2. Engineering beyond graduation.~~

2. Prepare students to disseminate new knowledge of fundamental or applied importance in Biological Engineering.

~~Produce theses which meet high academic standards and constitute significant applications of and contributions to Biological Engineering.~~

Learning Outcomes

Learning Outcomes

1. Students will gain advanced knowledge in Biological Engineering.

2. a. Thesis: Students will gain a necessary understanding of the fields of their research.

Learning Outcomes

~~b. Non-thesis: Students will apply advanced coursework ~~make satisfactory progress toward the completion of course requirements in preparation for conducting thesis research which constitutes a significant contribution to engineering problems in the field of Biological Engineering.~~~~

~~3. Engineering:~~

~~2. a. Thesis: Students will contribute new knowledge of fundamental or applied importance.~~

~~b. Non-thesis: Students will demonstrate (an) important application(s) of existing knowledge.~~

~~4. Students will be prepared to plan thesis research which meets high academic standards and constitutes a significant contribution to Biological Engineering.~~

~~3. Students will write a thesis which meets high academic standards and constitutes a significant contribution to Biological Engineering.~~

~~4. Students will be able to communicate effectively.~~

Description and justification of the request

| Description of specific change | Justification for this change |
|---|---|
| A new M.S.B.E. Non-thesis option is added to the existing M.S.B.E. program to increase graduate enrollment. | This option is created to increase graduate enrollment by: (1) providing more options to graduate applicants. (2) recruiting more students with industry career paths and non-traditional students. |
| A new Accelerated M.S.B.E. Degree Program is created to allow high-achieving B.S.B.E. students at the UA to apply up to 12 hours towards their M.S.B.E. degree. | This program is created for two purposes: (1) To retain high-achieving B.S.B.E. students and provide them with an accelerated schedule to obtain their M.S.B.E. degree. (2) To increase student population of the graduate program. |
| Information in the Program Goals and Objectives and Learning Outcomes is updated. | These updates are made not only to further clarify goals/objectives/learning outcomes but also to include the information for the M.S.B.E. Non-thesis option. |
| Editorial changes are made to the existing M.S.B.E. degree. | These changes are to further clarify the admission and degree requirements of the existing M.S.B.E. degree. |

Upload attachments

[letter-of-notification-MSBE-Oct 18 2023.pdf](#)

[MSBE_Before-After Curriculums.pdf](#)

[BENGMS - Curriculum Revision - Ltr of Notification_Rev_BOT.pdf](#)

Reviewer Comments

Kevin Hall (kdhall) (09/12/23 9:35 am): I strongly suggest and encourage the program to re-think the Program Goals and Objectives, and the Learning Outcomes. Consider using these definitions related to Objectives and Outcomes: Program Objectives – Program objectives are broad statements that describe what graduates are expected to attain within a few years after graduation. Program objectives are based on the needs of the program's constituencies. Student (Learning) Outcomes – Learning outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program.

Lisa Kulczak (lkulcza) (10/09/23 5:31 pm): Rollback: CIP Code changes require the submission of a Letter of Notification. Additionally, this proposal appears to be modifying more than 15 hours of program requirements, which is considered a major program change. Please select "Revising Curriculum of an Existing Certificate or Degree" as the reason for the modification, upload a LON and resubmit. Feel free to contact me if you have any questions.

Kevin Hall (kdhall) (10/31/23 4:05 pm): Rollback: (1) The description of the accelerated program contains these sentences: Eligible B.S.B.E. students can take up to 12 credit hours of 4000- and 5000-level courses as BENG or science electives for their bachelor's degree and those hours will also count towards their M.S.B.E. degree. The 12 credit hours may include a maximum of 6 hours of 4000-level courses, but the 4000-level BENG core courses required for their undergraduate degree shall not be counted. These descriptions do not specifically require the 4000-level courses to carry graduate credit. Please add wording clearly indicating that all courses used to satisfy the MSBE degree must be at the graduate level. (2) Reconsider the Program Objectives and Learning Outcomes, in light of previous comments. For example, "make satisfactory progress" is not a learning outcome.

Ed Bengtson (egbengts) (11/13/23 11:22 am): Rollback: Admission requirement related to GRE is a specific cut score which is against Graduate School policy.

Kevin Hall (kdhall) (11/15/23 3:38 pm): Rollback: Per GSIE, please remove the reference to a specific minimum score on the GRE.

Jim Gigantino (jgiganti) (11/20/23 10:21 am): Rollback: Rollback as per GRAD Dean

Ed Bengtson (egbengts) (11/21/23 9:59 am): Changed English language proficiency requirements to align with Graduate School policy. Changed Graduate Faculty status to group III to align with Graduate School policy. Added phrase that reflects all 4000-level courses must be approved by Graduate School as per policy.

Lisa Kulczak (lkulcza) (12/21/23 4:27 pm): Updated submitter information and next scheduled program review.

Lisa Kulczak (lkulcza) (12/21/23 4:42 pm): Proposal includes a change to the program CIP code in addition to revising the curriculum. Uploaded a revised LON to include appropriate BOT and ADHE approval dates.

Lisa Kulczak (lkulcza) (12/21/23 5:14 pm): Fall 2024 effective date pending the timing of the completion of the necessary approvals. ATTENTION REGISTRAR: Please remove Undergraduate Council from the workflow.

Lisa Kulczak (lkulcza) (12/21/23 5:41 pm): Hyperlinked inline courses and updated to new catalog numbers due to common course numbering conversion. The college is encouraged to review for accuracy, particularly for BENG 500V/BENG 5000V. The title of that course is Advanced Topics in Biological Engineering.

Gina Daugherty (gdaugher) (01/01/24 2:29 pm): Removed Undergraduate Council from workflow.

Key: 274