New Program Proposal

The following must be submitted to complete a new program request:

Submission Checklist:

☒ New Program Proposal
☒ Business Plan (https://www.ache.edu/index.php/forms/)
☒ Undergraduate or Graduate Curriculum Plan (https://www.ache.edu/index.php/forms/)

Primary Contact Information

Institution: Auburn University
Contact: Dr. Mark DeGoti
Title: SACSCOC Liaison
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Program Information

Date of Proposal Submission: 3/13/2026
Award Level: Doc Research (IPEDS 17)
Award Nomenclature (e.g., BS, MBA): PhD
Field of Study/Program Title: Biomedical Engineering
CIP Code (6-digit): 14.0501

Administration of the Program

Name of Dean: Dr. Mario Eden
Name of College/School: Samuel Ginn College of Engineering
Name of Chairperson: Dr. Selen Cremaschi
Name of Department/Division: Department of Chemical Engineering
Name of Representative for the Proposal (if not chair): Dr. Elizabeth Lipke

Implementation Information

Proposed Program Implementation Date: 1/1/2027
Anticipated Date of Approval from Institutional Governing Board: 4/17/2026
Anticipated Date of ACHE Meeting to Vote on Proposal: 6/12/2026
SACSCOC Sub Change Requirement (Notification, Approval, or NA): NA
Other Considerations for Timing and Approval (e.g., upcoming SACSCOC review): N/A

New Program Proposal

I. Program Description

A. Concise Program Summary (one paragraph) to be included in ACHE Agenda:

The proposed Doctor of Philosophy (PhD) degree program in Biomedical Engineering at Auburn University is designed to prepare graduates for advanced research, innovation, and leadership roles that support Alabama's growing biotechnology, pharmaceutical, and biomanufacturing industries. The program will provide rigorous doctoral-level training at the interface of engineering and human health, including advanced preparation in engineering fundamentals and biomedical science and interdisciplinary and translational research experience in specialized areas such as biomaterials, drug delivery, cell and tissue biomanufacturing, medical imaging, diagnostics, medical devices, computational analysis, and biomechanics. Training will include professional development in project management, bioethics, and technical communication. The proposed PhD program leverages existing engineering faculty expertise and research infrastructure and ongoing coursework and interdisciplinary collaborations across multiple colleges, departments, and units at Auburn University to contribute to the state's research capacity and innovation ecosystem.

B. Specific Rationale (Strengths) for the Program

List three (3) to five (5) strengths of the proposed program as specific rationale for recommending approval of this proposal.

1. Biomedical engineering research, education, and training is already ongoing at Auburn University across the Samuel Ginn College of Engineering; the proposed Biomedical Engineering PhD degree program integrates currently offered coursework and health-related interdisciplinary research across all engineering departments into a concerted program. This program will provide a synergistic and cohesive training track for doctoral-level students pursuing biomedical engineering careers in academia or industry, thereby improving instructional efficiency, responsibly stewarding Auburn University research infrastructure and investments, and enhancing the overall quality of the student educational experience.
2. Graduates of the proposed Biomedical Engineering PhD degree program will lead advances in improving health and healthcare outcomes for constituents of Alabama and beyond by applying advanced critical thinking and problem solving skills, generating new knowledge in the biomedical and health-related fields, and integrating technical literature findings with their own innovation.
3. Sustained innovation in Alabama's biotechnology, pharmaceutical, and biomanufacturing sectors, as well as in our academic institutions, depends on the recruitment and retention of technical leaders with demonstrated expertise in biomedical and health-related engineering. Currently, Auburn graduates who wish to pursue graduate training in Biomedical Engineering typically leave the state to do so and often do not return. The proposed Biomedical Engineering Doctoral program will help retain Auburn-trained engineers, attract and retain the highest caliber of faculty and graduate students, and

support the subject matter expert-pipeline for biomedical-related industry sectors in the State of Alabama.

C. External Support (Recommended)

List external entities (more may be added) that may have supplied letters of support attesting to the program's strengths and attach letters with the proposal at the end of this document.

1. Jeremy D. Blanks, PhD, President and CEO of BIO Alabama
2. Stacy Kelpke, PhD, Fitz-Thors Industries, Bessemer
3. Brad Cates, Evonik, Birmingham
4. Derrick Dean, PhD, Department of Engineering Chair, Alabama State University

D. Student Learning Outcomes

List four (4) to seven (7) of the student learning outcomes of the program.

1. Demonstrate advanced theoretical mastery of biomedical engineering fundamentals and specialized-field specific expertise that is sufficient to critically evaluate, extend, and advance knowledge in a chosen research area (e.g., Biomaterials and Drug Delivery, Cell and Tissue Biomanufacturing, Medical Imaging and Diagnostics, Computational Biomedical Engineering, or Biomechanics and Devices).

2. Formulate novel biomedical engineering research questions by critically synthesizing the technical literature, identifying knowledge gaps, and selecting or developing appropriate analytical, computational, or experimental approaches to address these questions.[EL1.1][EL1.2]

3. Independently integrate advanced engineering principles with biological and medical sciences to solve novel research questions and generate new knowledge or capabilities, including the ability to conceive, design, execute, and interpret original biomedical engineering research that meets the standards for peer-reviewed scholarly dissemination.

4. Effectively communicate complex, engineering and healthcare-related concepts and research findings via written, oral, and visual modalities and to expert and non-expert audiences.

5. Demonstrate strong independent intellectual leadership and professional responsibility in biomedical engineering research, including mentorship, collaboration, and ethical decision-making within multidisciplinary research environments.

E. Similar Programs at Other Alabama Public Institutions

List programs at other Alabama public institutions of the same degree level and the same (or similar) CIP codes. If no similar programs exist within Alabama, list similar programs offered

within the 16 SREB states. If the proposed program duplicates, closely resembles, or is similar to any other offerings in the state, provide justification for any potential duplication.

CIP Code	Degree Title	Institution with Similar Program	Justification for Duplication
14.0501	Biomedical Engineering	University of Alabama at Birmingham	The UAB Biomedical Engineering PhD program focuses on a wide range of of biomedical engineering topics, including biomedical imaging, biomedical devices and implants, cardiac electrophysiology, computational modeling and regenerative medicine. Current biomedical engineering graduate education and research activities at Auburn University are ongoing across the entire College of Engineering and focus on applying existing core engineering fundamentals to medical and health-related questions. The proposed coursework and training are more application- and industry-focused and less clinical research-focused, while still emphasizing translational biomedical technologies. The proposed PhD program is being requested to integrate this ongoing training into one concerted program, making it accessible to Auburn students.

The proposed Biomedical Engineering PhD program at Auburn University builds upon and incorporates foundational concepts from a broad range of existing core engineering disciplines (e.g. Aerospace Engineering, Chemical Engineering, Computer Science, Electrical Engineering, Industrial and Systems Engineering, Materials Engineering, or Mechanical Engineering). This distinction offers a different and complementary perspective and skillset for addressing complex challenges in healthcare, rather than duplicating more clinically-oriented biomedical engineering programs. The proposed PhD program is being requested to integrate ongoing training into one concerted program, making it accessible to Auburn students.

F. Relationship to Existing Programs within the Institution

Nearly all new programs have some relationship to existing offerings through shared courses, faculty, facilities, etc. Is the proposed program associated with any existing offerings within the institution, including options within current degree programs? **Yes** ☒ **No** ☐

If ***yes***, please describe these relationships including whether or not the program will replace or compete with existing offerings: (***Note:*** If this is a graduate program, list any existing undergraduate programs which are directly or indirectly related. If this is a doctoral program, also list related master's programs.)

If ***not***, please describe how the institution plans to support a program unrelated to existing offerings.

The proposed Biomedical Engineering PhD program aligns our ongoing educational offerings with students' academic goals. This program will bring together the ongoing biomedical engineering graduate coursework and research training already being offered in the Auburn University Aerospace Engineering, Chemical Engineering, Computer Science, Electrical Engineering,

Industrial and Systems Engineering, Materials Engineering, and Mechanical Engineering programs. Currently each of these programs offers one or two elective courses in biomedical engineering; graduate students conducting biomedical engineering research in these departments currently take these classes as their elective courses, along with other field-specific core engineering courses required by these degree programs. Unfortunately, in many cases, the prescribed coursework is not aligned with students' educational needs.
By having the proposed PhD program, graduate students will be able to specifically study biomedical engineering, instead of trying to self-organize a program of study through selection of electives, improving their educational experience. Biomedical engineering graduate students will have access to both the planned biomedical engineering core courses, some of which are already being offered as graduate electives in chemical engineering, and the breadth of interdisciplinary biomedical engineering graduate elective courses. This will better prepare these students to undertake the ongoing biomedical engineering research across the Samuel Ginn College of Engineering and be more effective as they enter the workforce. The Biomedical Engineering PhD program will enable students undertaking this research to conduct their studies with graduate course and degree requirements aligned with their career objectives.

Course requirements are aligned such that students from the proposed Biomedical Engineering MS degree program will be able to seamlessly transition into the PhD program. Additional course requirements will depend on whether the thesis or non-thesis MS was completed and MS elective course selection. Current BS students are already being recruited into ongoing PhD programs in Auburn University Aerospace Engineering, Chemical Engineering, Computer Science, Electrical Engineering, Industrial and Systems Engineering, Materials Engineering, and Mechanical Engineering programs to undertake biomedical engineering research and coursework. This is expected to continue and increase with the availability of a biomedical engineering PhD program.

G. Collaboration

Have any collaborations **within your institution** (i.e., research centers, across academic divisions, etc.) been explored? **Yes ☒ No ☐**

If ***yes***, provide a brief explanation of the proposed collaboration plan(s) for the program:

The proposed biomedical engineering PhD program is an interdisciplinary collaborative effort across all engineering disciplines at Auburn University.. Planning has been coordinated by the Auburn Biomedical Engineering Advisory Committee, which includes faculty from the Aerospace Engineering, Chemical Engineering, Computer Science, Electrical Engineering, Industrial and Systems Engineering, Materials Engineering, and Mechanical Engineering departments.

The Auburn Biomedical Engineering Advisory Committee leadership has also worked extensively with the Auburn University College of Science and Mathematics (COSAM) during the proposed program development. An undergraduate curriculum model has been established that will enable COSAM Biomedical Sciences students to bridge into the proposed Biomedical Engineering graduate programs ; plans are also being developed for Physics Pre-Medicine undergraduates. Based on Auburn University student surveys conducted by the Auburn Biomedical Engineering Advisory Committee, a high level of interest in pursuing graduate education in biomedical engineering is anticipated among COSAM Pre-Health majors. The joint curriculum plans are designed to provide a seamless transition for these students, preparing them for graduate studies, including MS and then PhD programs, while maintaining the high standards of engineering education. In addition to COSAM students, it is anticipated that undergraduate students completing a Bachelor of Science in Drug and Biopharmaceutical Sciences in the Harrison College of Pharmacy or in Applied Biotechnology in the

College of Agriculture may also be interested in preparing to undertake biomedical engineering graduate studies, including completing engineering bridge coursework; these curriculum discussions have been initiated.

Have collaborations with **other institutions or external entities** (i.e., local business, industries, etc.) been explored? **Yes** ☒ **No** ☐

If ***yes***, provide a brief explanation of the proposed collaboration plan(s) for the program:

Although the proposed biomedical engineering programs do not require the support of other institutions or external entities, industry input has informed decision making about the design of the proposed Biomedical Engineering PhD program curriculum and the content of the required core courses.

Industry input has been sought from Alabama employers through multiple avenues, including in person facilitated round table discussions during the Auburn Biomedical Engineering Industry Day, an online survey, and on campus meetings with BIO Alabama representatives, and informal meetings with Auburn alumni and other stakeholders.

Industry stakeholders indicated that they valued training in complex engineering problem-solving and trouble-shooting skills, project management and ethical decision making, appropriate utilization of computation and AI tools, knowledge of regulatory requirements and use of standard operating procedures, and communication skills. Opportunities for students to learn and apply these skills have been integrated into the existing and new core and elective courses for biomedical engineering PhD students.
In addition, plans have been informed by long-term discussions with the Alabama State University leadership of the Department of Engineering, which includes an undergraduate program in Biomedical Engineering. Plans are designed to meet the needs and interests of these students for biomedical engineering graduate education.

H. Programmatic Accreditation

Select the appropriate program accreditor from the drop-down menu below:

Southern Association of Colleges and Schools Commission on Colleges (SACSCOC)

Provide a detailed timeline for gaining accreditation (i.e., when will full candidacy be reached?): N/A

I. Professional Licensure

Will the program be considered a Professional Licensure Program based on the following definition: **Yes** ☐ **No** ☒

Professional Licensure Program: As defined in federal regulations, an instructional program that is designed to meet educational requirements for a specific professional license or certification that is required for employment in an occupation or is advertised as meeting such requirements.

If ***yes***, please explain:

Select the appropriate licensure body from the table below:

Choose an item.

Select the appropriate license from the table below:

Choose an item.

J. Professional Certification

Will students earn industry certifications while completing the degree or be prepared for industry certifications upon graduation? **Yes** ☐ **No** ☒

If ***yes***, please explain:

K. Admissions

Provide any additional admissions requirements beyond the institution's standard admissions process/policies for this degree level. Include prerequisites, prior degrees earned, etc.

Students will be admitted following standard engineering graduate degree admissions/policies for this degree level.

L. Mode of Delivery

Provide the planned delivery format(s) of the program as defined in policy (i.e., in-person, online, hybrid). Please also note whether any program requirements can be completed through competency-based assessment. Hybrid.

Can students complete the entire degree program through distance education (100% online) based on the following definition? **Yes** ☐ **No** ☒

Distance Education: An academic program for which required instructional activities can be completed entirely through distance education modalities. A distance education program may have in-person requirements that are non-instructional (e.g., orientation, practicum).

The students cannot complete the entire Biomedical Engineering PhD program through distance education. The coursework for PhD students will be delivered in-person, although the planned courses are typically all delivered as hyflex courses (jointly in-person and online) to accommodate distance education MS students.

M. Instructional Site(s)

Provide the planned location(s) where the program will be delivered (i.e., main campus, satellite campus, off-campus site.) If the program will be offered at an off-campus site, provide the existing site name or submit an ***Off-Campus Site Request*** if new.

Will more than 50% of this program be offered at an off-campus site(s) **Yes ☐ No ☒**

If ***yes***, which sites?

N. Industry Need

Using the federal **Standard Occupational Code (SOC) System**, indicate the top three occupational codes related to post-graduation employment from the program. A full list of SOCs can be found at https://www.onetcodeconnector.org/find/family/title#17.

SOC 1 (**required**): 17-2031: Bioengineers and Biomedical Engineers

SOC 2 (optional): 17-2199: Engineers, All Other (occupations requiring bachelor's degrees in one area of engineering (e.g. chemical, mechanical, electrical, materials engineering) and graduate education in biomedical engineering, including occupations in pharmaceutical/nutraceutical production, biomedical materials, biomanufacturing, among others)

SOC 3 (optional): 19-1029.01: Bioinformatics Scientists

Briefly describe how the program fulfills a specific industry or employment need for the State of Alabama. As appropriate, discuss alignment with Alabama's Statewide or Regional Lists of In-Demand Occupations (https://www.ache.edu/index.php/policy-guidance/) or with emerging industries as identified by Innovate Alabama or the Economic Development Partnership of Alabama (EDPA).

The State of Alabama has prioritized economic development through the expansion of its biotechnology and pharmaceutical industries. Companies employing biomedical engineering-trained personnel contribute substantially to the state economy. As reported by the EDPA, the bioscience and biomedical sectors generate approximately $7.3 billion in annual economic activity and support nearly 48,000 jobs statewide. The state has also invested in translating biotechnology research into clinical and commercial impact through the HudsonAlpha Institute for Biotechnology in Huntsville, Station 41 in Birmingham, and the Wiregrass Innovation Center in Dothan, each of which serves as an incubator for biotechnology companies. Continued growth of Alabama healthcare and biotechnology companies such as BioCryst Pharmaceuticals, Brookwood Pharmaceuticals, Evonik Industries, Baxter International, Turner Medical, and Oxford Pharmaceuticals, along with many startup companies, has elevated awareness of the need for workforce development. The Bronze Valley initiative launched in 2018 strengthens workforce development and capital access for science- and technology-based innovation. More recently, in 2025, Eli Lilly announced plans to construct a $6 billion next-generation synthetic medicine active pharmaceutical ingredient manufacturing facility in Huntsville, bringing approximately 450 high-value jobs, including engineering positions. Collectively, biotechnology and pharmaceutical industries rely heavily on graduate-educated biomedical engineers for advancing research, development, and manufacturing.

In alignment with Alabama's economic prioritization of these sectors, local workforce demand for biomedical engineers has increased accordingly. More graduates with combined expertise in engineering, biotechnology, and translational healthcare that want to live and work in Alabama are needed. According to the EAB Market Pulsecheck for Auburn, the average monthly job growth for master's level biomedical engineering professionals was 2.23% in the states from which Auburn University draws online engineering students (compared to 1.96% nationally), and growth in student demand for such programs outpaced growth in competition. BIO Alabama has identified recruiting and retaining employees as a challenge for biotechnology companies. Companies who participated in the Auburn Biomedical Engineering Industry Day expressed strong interest in hiring Auburn students with graduate-level biomedical engineering training and in partnering with Auburn to meet continuing education needs. Based on i) external analyses of statewide industry needs, ii) employer surveys and industry representative focus groups conducted by the Auburn University Biomedical Engineering Advisory Committee, and iii) polling of Auburn undergraduate STEM majors, there is both a demonstrable shortage of biomedical engineering talent to support Alabama companies and an overwhelming student interest in pursuing this career path.

For Alabama's significant investments in biotechnology economic development to be fully realized, an adequately trained workforce must also be available. There is a strong local, in addition to national, need for graduates who are highly skilled in biotechnology (i.e. the integrated fields of engineering and biological and medical sciences – biomedical engineering) to supply the workforce necessary to drive innovation in these growing sectors. Auburn University is uniquely positioned to support state efforts in alleviating this shortage of trained biomedical engineers through existing faculty expertise, a strong focus on industrial translation, and long-standing partnerships with industry.

O. Additional Education/Training

Please explain whether further education/training is required for graduates of the proposed program to gain entry-level employment in the SOC occupations selected above.

Further training is not required for graduates of the proposed program to gain entry-level employment in the SOC occupations selected above.

P. Student Demand

Please explain how you projected the student enrollment numbers in the **Business Plan, Lines 24-27** and provide evidence to substantiate student demand (i.e., surveys, enrollments in related courses, etc.).

Biomedical Engineering PhD new student enrollment numbers are estimated to reach a steady state of five by year four. The full student enrollment numbers are reported in the Business Plan, Lines 24-27; these numbers were determined based on a very conservative estimate of the numbers of students expected to enroll in the PhD program. The information used in this projection was collected through an EAB study, an employer survey, a survey of current Auburn University students, and knowledge of the numbers of PhD students currently working on biomedical

engineering related research across the Samuel Ginn College of Engineering. There are over twenty faculty members actively conducting biomedical engineering research with an average of 3-6 PhD externally funded students per research group; if one of the students from each research group is in the biomedical engineering PhD program, that would yield over 10 new students enrolling in the PhD program per year.

II. Program Resources and Expenses

A. All Proposed Program Personnel

Provide all personnel counts for the proposed program.

Employment Status of Program Personnel		Personnel Information		
		Count from Proposed Program Department	Count from Other Departments	Subtotal of Personnel
Current	Full-Time Faculty	7	17	24
	Part-Time Faculty	0	0	0
	Administration	0	0	0
	Support Staff	1	0	1
**New To Be Hired	Full-Time Faculty	0	0	0
	Part-Time Faculty	0	0	0
	Administration	0	0	0
	Support Staff	0	0	0
		Personnel Total		**25**

Provide justification that the institution has proposed a sufficient number of faculty (full-time and part-time) for the proposed program to ensure curriculum and program quality, integrity, and review:

The proposed Biomedical Engineering program is supported by a sufficient number of qualified full-time Auburn University faculty to ensure curriculum quality, integrity, and ongoing program review. Faculty across multiple engineering departments are already regularly teaching the majority of the proposed biomedical engineering coursework (as listed in the Proposed Faculty Roster below with their prior department-specific course numbers), providing an established instructional foundation for the program. While the program could technically rely on these existing course offerings to meet minimum requirements, doing so without dedicated instructional capacity would limit scheduling flexibility, coordinated oversight, and long-term program quality.

To ensure reliable course availability, curricular coherence, and appropriate faculty engagement, the Business Plan includes support to buy out instructional time for faculty with core biomedical engineering expertise to teach both biomedical engineering core courses and

a rotating schedule of biomedical engineering electives. This approach ensures that faculty can commit consistent effort to the biomedical engineering curriculum while providing their home departments with the resources needed to maintain instructional coverage.

In addition to supporting already ongoing courses, the Business Plan also supports buying out instructional time for faculty to offer the proposed new core Biomedical Engineering courses following the initial program roll-out: BMEN 6860 Biomedical Engineering Project Management, Bioethics, and Research Skills, BMEN 6870 Quantitative and Mathematical Methods in BME, and BMEN 6840 Computational Fundamentals in Biomedical Engineering. These courses are designed to provide training aligned with the skill sets being sought by industry employers in the state, as identified in our Auburn Biomedical Engineering Industry Day facilitated round table discussions, Employer Survey, and the EAB studies.

In addition to buying out instructional time for tenure-track faculty across engineering departments, the Business Plan includes covering the costs of one existing full-time lecturer position in the Department of Chemical Engineering. Having one lecturer will provide stable instructional support; this faculty member has the experience and expertise needed to either teach core biomedical engineering courses or cover the full range of core undergraduate chemical engineering courses to enable research-active faculty to teach graduate-level biomedical engineering courses.

To support mastery of graduate level engineering fundamentals, students will also be required to take one course selected from approved foundational graduate engineering curriculum aligned with their BS engineering expertise. These courses are all regularly offered by current full-time faculty as communicated in the Proposed Faculty Roster below. It is anticipated that students will select different courses; therefore, the additional student numbers per course will be relatively low.

The PhD Business Plan includes the student numbers and fractional costs for the proposed Biomedical Engineering PhD program.

Together, these measures establish a sustainable faculty staffing model that supports high-quality instruction, effective program oversight, and continuous curricular review.

Note: Include ***any new funds*** designated for compensation costs (faculty, administration, and/or support staff to be hired) in the **Business Plan, Line 7 - Personnel Salaries and Benefits**. Current personnel salary/benefits ***should not be included*** in the Business Plan.

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B. Proposed Faculty Roster*

Complete the following **Faculty Roster** to provide a brief summary and qualifications of current faculty and potential new hires specific to the program.

***Note**: Institutions must maintain and have current as well as additional faculty curriculum vitae available upon ACHE request for as long as the program is active, but CVs are **not** to be submitted with this proposal.

Current Faculty			
1	2	3	4
CURRENT FACULTY NAME (FT, PT)	COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)	ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed	OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)
Lipke, Elizabeth (FT)	1. CHEN 6810: Biomedical Engineering (3 ch, G) (Spring: 2017, 2019, 2021, 2023) (Fall: 2024) 2. CHEN 6970: Cell and Tissue Engineering (3 ch, G) (Spring: 2013, 2014, 2016, 2020, 2024) 3. CHEN 7100: Graduate Transport (3 ch, G) (Fall: 2019, 2020, 2021)	BS, Biomedical Engineering, Johns Hopkins University PhD, Chemical Engineering, Rice University	Dissertation: Localized Drug Delivery from Poly(ethylene glycol) Copolymers from the Prevention of Restenosis Postdoctoral Fellow, Johns Hopkins University, Biomedical Engineering IP, OL
Habbit, Nicole (FT)	1. CHEN 6810: Biomedical Engineering (3 ch, G) (Fall: 2023) 2. CHEN 6970: Quantitative Physiology (3 ch, G) (Spring: 2024)	BS, Chemical Engineering, The University of New Mexico MS, Chemical Engineering, Auburn University PhD, Chemical Engineering, Auburn University	Dissertation: Bioinspired Microphysiological Systems for *in vitro* Elucidation of Prostate Tumorigenic Progression and Application in Pre-Clinical Therapeutic Evaluation IP, OL
Ashurst, Robert (FT)	1. CHEN 7100: Graduate Transport (3 ch, G) (Fall: 2010, 2013, 2021, 2025)	BS, Chemical Engineering, Auburn University PhD, Chemical Engineering, University of California at Berkeley	IP, OL
Alexander Symone (FT)	1. CHEN 7250: Chemical Reaction Engineering (3 ch, G) (Spring: 2021, 2022)	BS, Chemical Engineering, Howard University PhD, Macromolecular Science and Engineering, Case Western Reserve University	Eckert Postdoctoral Research Fellow, Georgia Institute of Technology, Chemical and Biomolecular Engineering IP, OL
Beckingham, Bryan (FT)	1. CHEN 7200: Chemical Engineering Thermodynamics (3 ch, G) (Fall: 2025)	BS, Chemical Engineering, Clarkson University MS, Chemical Engineering, Princeton University PhD, Chemical & Materials Engineering, Princeton University	IP, OL
Hanley, Thomas (FT)	1. CHEN 6800: Biochemical Engineering (3 ch, G) (yearly from Spring 2007 through Spring 2026) 2. CHEN 7250: Chemical Reaction Engineering (3 ch, G) (yearly from Spring 2017 through 2020 and from Spring 2023 through 2026)	PhD, Chemical Engineering, Virginia Tech MBA, Management, Wright State University MS, Chemical Engineering, Virginia Tech BS, Chemical Engineering, Virginia Tech	IP, OL
He, Peter (FT)	1. CHEN 7200: Chemical Engineering Thermodynamics (3 ch, G) (Fall 2021, 2022, 2023, 2024)	BS, Chemical Engineering, Tsinghua University PhD, Chemical Engineering, University of Texas at Austin	IP, OL

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Current Faculty			
1	**2**	**3**	**4**
CURRENT FACULTY NAME (FT, PT)	**COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)**	**ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed**	**OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)**
Panagiotis, Mistriotis (FT)	1. CHEN 6970: Cell and Tissue Engineering (3 ch, G) (Spring: 2022, 2026) 2. CHEN 7100: Graduate Transport (3 ch, G) (Fall: 2023, 2024)	BS, Chemical Engineering, National Technical University of Athens MS, Human Biology, University of Copenhagen PhD, Chemical Engineering, University at Buffalo	Dissertation: Reversing stem cell aging: Implications for vascular regeneration Postdoctoral Fellow, Johns Hopkins University, Chemical and Biomolecular Engineering IP, OL
Pantazes, Robert (FT)	1. CHEN 6970: Machine Learning – Guided Protein Design (3 ch, G) (Spring: 2026)	PhD, Chemical Engineering, Penn State BS, Chemical Engineering, Penn State	Dissertation: The Development of Computational Methods for Designing Antibodies and Other Proteins Postdoctoral Researcher, University of California, Santa Barbara, Identified Biomarkers for Autoimmune Diseases IP, OL
Rice, Jeffrey (FT)	1. CHEN 5979/6970: Protein Engineering (3 ch, G) (Spring: 2017, 2018) 2. CHEN 6810: Biomedical Engineering (3 ch, G) (Spring: 2019)	BS, Chemical Engineering, Georgia Institute of Technology PhD, Chemical Engineering, University of California, Santa Barbara	Postdoctoral Fellow, École Polytechnique Fédérale de Lausanne (EPFL) IP, OL
Schall, Mark (FT)	1. INSY 8020: Research Methods in Occupational Safety, Ergonomics, & Injury Prevention (3 ch, G) (Spring: 2017, 2020, 2022, 2026) 2. INSY 6080: Human Factors Engineering (3 ch, G) (Summer: 2016-2018, 2020-2025; Fall: 2021, 2023, 2025)	PhD, Industrial Engineering, University of Iowa MS, Industrial Engineering, University of Iowa BS, Industrial Engineering, University of Iowa	Dissertation: Application of inertial measurement units for directly measuring occupational exposure to non-neutral postures of the low back and shoulder. IP, OL
Acosta-Sojo, Yadrianna (FT)	1. INSY 7060: Fundamentals of Ergonomics (3 ch, G) (Fall: 2023, 2025) 2. INSY 7070: Occupational Biomechanics (3 ch, G) (Spring: 2024, 2026)	PhD, Industrial and Operations Engineering, University of Michigan – Ann Arbor MSE, Industrial and Operations Engineering, University of Michigan – Ann Arbor BS, Industrial Engineering, University of Puerto Rico - Mayagüez	Dissertation: Understanding Age Effects and Adaptation of Sensory and Motor Rehabilitation Procedures for Stroke Patients Postdoctoral Fellow, University of Michigan, Industrial and Operations Engineering IP, OL
Daniel F. Silva (FT)	1. INSY 6600: Engineering Economic Systems (3 ch, G) (Spring: 2026)	PhD, Operations Research, Georgia Tech MS, Operations Research, Georgia Tech MS, Industrial Engineering, Universidad de Los Andes (Colombia) BS, Industrial Engineering, Universidad de Los Andes (Colombia)	IP, OL
Hickman, Sharon (PT)	1. INSY 6650: Healthcare Systems, Culture, and Policy (3 ch, G) (Spring) 2. INSY 6670: Human Factors in Healthcare (3 ch, G) (Fall)	BS, Industrial Engineering, Auburn University MBA, Western Governors	Over 25 years in healthcare. Over 10 years in senior leadership roles. Nationally recognized. Appointed by Secretary of Health and Human Services to serve on the National Advisory Council for AHRQ. OL

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Current Faculty			
1	2	3	4
CURRENT FACULTY NAME (FT, PT)	**COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)**	**ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed**	**OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)**
Vinel, Alexander (FT)	1. INSY 7420: Linear Programming and Network Flows (3 ch, G)	PhD, Industrial Engineering, The University of Iowa MS, Applied Mathematics and Physics, Moscow Institute of Physics and Technology (State University) BS, Applied Mathematics and Physics, Moscow Institute of Physics and Technology (State University)	IP, OL
Chen, Pengyu (FT)	1. MATL 6700: Biomaterials (3 ch, G) (Summer: 2019; Fall: 2021, 2023, 2024, 2025) 2. MATL 7630: Nanomaterials for Biotechnology (3 ch, G) (Summer: 2018; Fall: 2020; Spring: 2025) 3. MATL 7600: Biosensors (3 ch, G)	BS, Materials Science and Engineering, Nanjing University MS, Materials Science and Engineering, Clemson University PhD, Materials Science and Engineering, Clemson University	Dissertation: Environmental and Biological Applications and Implications of Soft and Condensed Nanomaterials Postdoctoral Fellow, University of Michigan, Mechanical Engineering IP, OL
Kim, Dong-Joo (FT)	1. MATL 6200: Materials Characterization (3 ch, G) (Fall: 2019, 2020, 2020, 2021, 2021, 2022, 2023, 2024, 2025) 2. MATL 7610: Engineering Aspects of BioChem Detection (3 ch, G) (Summer: 2017)	BS, Materials Science and Engineering, Yonsei University MS, Materials Science and Engineering, Yonsei University PhD, Materials Science and Engineering, North Carolina State University	Postdoctoral Fellow, Argonne National Lab, Materials Division IP, OL
Michael E. Zabala (FT)	1. MECH 2130: Mechanical Engineering Statics (3 ch, UN) 2. MECH 3150: Dynamics Laboratory (1 ch, UN) 3. MECH 5/6330: Introduction to Biomechanical Engineering (3 ch, UN, G) 4. MECH 5/6500: Engineering in the Arts (3 ch, UN, G)	PhD, Mechanical Engineering, Stanford University MS, Mechanical Engineering, Stanford University BS, Mechanical Engineering, Auburn University	Dissertation: The Effects of ACL Injury and Reconstruction on Gait Mechanics and the Initiation of Knee Osteoarthritis
Missie Smith (FT)	1. INSY 7040: Cognitive Engineering & System Design (3 ch, G) (Spring: 2026)	PhD, Industrial & Systems Engineering, Virginia Tech MS, Industrial Engineering, Mississippi State University BS, Industrial Engineering, Mississippi State University	IP, OL
David Scarborough (FT)	1. AERO 7170	PhD, Mechanical Engineering, Georgia Institute of Technology MS, Mechanical Engineering, Georgia Institute of Technology BS, Mechanical Engineering, Georgia Institute of Technology	IP, OL
Haynes Heaton (FT)	1. COMP 6970: Computational Biology: Genomics and Transcriptomics	PhD, Computational Biology, Cambridge University MD, Brown University BS, Computer Science, Brown University	Dissertation: Computational methods for resolving genomic complexity using genetic variation IP, OL

New Program Proposal

Current Faculty			
1	2	3	4
CURRENT FACULTY NAME (FT, PT)	**COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)**	**ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed**	**OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)**
Edward Davis (FT)	1. MATL 5720/6720: Biomedical Applications of Polymers (3 ch, G) (Fall: 2016, 2019)	BS, Biomedical Engineering, Tulane University MS, Chemical Engineering, Tulane University PhD, Chemical Engineering, University of Akron	Dissertation: Polymerized Bicontinuous microemulsions as controlled release devices IP, OL
Denney, Thomas (FT)	1. ELEC 6810: Computed Imaging Systems (3 ch, G)	BS, Electrical Engineering, Auburn University MS, Electrical Engineering, Auburn University PhD, Electrical Engineering, Johns Hopkins University	Dissertation: Stochastic Estimation of Deformable Motion from Magnetic Resonance Tagged Cardiac Images IP
Deshpande, Gopikrishna (FT)	1. ELEC 7970: Magnetic Resonance Imaging and its Applications (3 ch, G) (Spring: 2012) 2. ELEC 8970: Current Topics in Magnetic Resonance Imaging (3 ch, G) (Fall: 2012; Spring: 2014) 3. ELEC 7970: Neuroinformatics (3 ch, G) (Spring: 2013) 4. ELEC 6970: Modeling and System Identification: Biomedical Applications (3 ch, G) (Fall: 2013, 2014) 5. ELEC 6970: Current Topics in Functional MRI (3 ch, G) (Spring: 2015) 6. ELEC 8970: Advanced Topics in Functional MRI (3 ch, G) (Fall: 2015) 7. ELEC 6810: Computed Imaging Systems (3 ch, G) (Spring: 2023, 2024, 2025)	BTech, Electronics and Communication Engineering, National Institute of Technology, Warangal, India MS, Electrical Communication Engineering, Indian Institute of Science, Bangalore, India PhD, Biomedical Engineering, Georgia Institute of Technology, Atlanta, USA	Dissertation: Nonlinear and Network Characterization of Brain Function using Functional MRI Data Postdoctoral Fellow: Emory University, Biomedical Engineering IP, OL
Reid, Meredith (FT)	1. ELEC 7900: Independent Study – Data Science for Neuroimaging (3 ch, G) (Summer: 2025) 2. ELEC 7900: Independent Study – Magnetic Resonance Spectroscopy Principles and Techniques (3 ch, G) (Summer: 2025) 3. ELEC 7900: Independent Study – Neuroimaging Meta-Analysis (3 ch, G) (Summer: 2020)	BS, Biomedical Engineering, The University of Alabama at Birmingham MS, Biomedical Engineering, The University of Alabama at Birmingham PhD, Biomedical Engineering, The University of Alabama at Birmingham	Dissertation: Mesocorticolimbic abnormalities in schizophrenia: a magnetic resonance spectroscopy and diffusion tensor imaging study Postdoctoral Fellow, Auburn University MRI Research Center IP, OL
Huang, Shuai (FT)	1. ELEC 7450: Digital Image Processing (3 ch, G) (Spring: 2025, 2026)	BS, Electrical Engineering, Harbin Institute of Technology PhD, Electrical and Computer Engineering, Johns Hopkins University	Postdoctoral Fellow, University of Illinois at Urbana-Champaign, Coordinated Science Laboratory Postdoctoral Fellow, Emory University, Department of Radiology and Imaging Sciences IP, OL

New Program Proposal

Current Faculty			
1	2	3	4
CURRENT FACULTY NAME (FT, PT)	**COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)**	**ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed**	**OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)**
Bashir, Adil (FT)	1. ELEC 6360: Bio-Medical Applications of Electromagnetics (3 ch, G) (Spring: 2019, 2020, 2021) 2. ELEC 6810: Computed Imaging Systems (3 ch, G) (Fall: 2018, 2019, 2020, 2021) 3. ELEC 5340/6340: RF & Microwave Engineering (3 ch, G) (Spring: 2023, 2024, 2025, 2026)	BS, University of Engineering and Technology Lahore, Pakistan MS, Massachusetts Institute of Technology, Cambridge, MA PhD, Massachusetts Institute of Technology, Cambridge, MA	Dissertation: Magnetic Resonance Imaging of Proteoglycans in Cartilage. IP, OL
Ku, Jeff (FT)	1. COMP 6120: Database Systems I (3 ch, G) (Spring: 2024, 2025; Fall: 2024, 2025) 2. COMP 6130: Data Mining (3 ch, G) (Spring: 2024; Fall: 2024)	PhD, Computer Science, University of Southern California MS, Computer Science, University of Southern California MS, Electrical Engineering, University of Southern California BS, Information and Computer Education, National Taiwan Normal University	IP, OL
Aakur, Sathyanarayanan (FT)	1. COMP 6600: Artificial Intelligence (3 ch, G) (Fall: 2024, 2025) 2. COMP 6630: Machine Learning (3 ch, G) (Spring: 2024)	PhD, Computer Science and Engineering, University of South Florida MS, Management Information Systems, University of South Florida BS, Electronics and Communication Engineering, Anna University (India)	IP, OL
Farhana, Effat (FT)	1. COMP 6630: Machine Learning (3 ch, G) (Fall: 2024, 2025)	PhD, Computer Science, North Carolina State University BS, Computer Science and Engineering, Bangladesh University of Engineering and Technology	IP, OL
Zhou, Yang (FT)	1. COMP 6130: Data Mining (3 ch, G) (Spring: 2024, 2025; Fall: 2024, 2025)	PhD, Computer Science, Georgia Institute of Technology ME, Computer Application Technology, Chongqing University BE, Engineering, Jiangnan University	IP, OL
Kyle Schulze (FT)	1. MECH 6970:Soft Matter Mechanics (3 ch, G)	BSME, MS, PhD, Mechanical Engineering, University of Florida	
Rose, Chad (FT)	1. MECH 5840/6840: Applied Mechatronics (3 ch, G) 2. MECH 7870: Haptics and Human-Robot Interaction (3 ch, G)	MS, PhD, Mechanical Engineering, Rice University BS, Mechanical Engineering, Auburn University	Dissertation: Hybrid Rigid-Soft Exoskeleton Design Postdoctoral Research, Mechanical Engineering University of Texas at Austin (rehabilitation robotics; stroke) IP, OL
Additional faculty advising graduate students conducting Biomedical Engineering Research			
David, Allan	1. CHEN 8990: Research and Dissertation (variable ch, G) (2012-present)	BS, Chemical Engineering, University of Maryland, College Park PhD, Chemical Engineering, University of Maryland, College Park	Dissertation: Immobilization of Enzymes on Nanoporous, Silica Composites Postdoctoral Fellow, University of Michigan, Pharmaceutical Sciences

New Program Proposal

Current Faculty			
1	**2**	**3**	**4**
CURRENT FACULTY NAME (FT, PT)	**COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)**	**ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed**	**OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)**
Maria Auad	1. CHEN 8990: Research and Dissertation (variable ch, G)	BS, Chemical Engineering, University of Mar del Plata, Argentina PhD, Materials Science, University of Mar del Plata, Argentina	Postdoctoral Fellow, Chemical Engineering, CALTECH Postdoctoral Fellow, Materials Science, University of Southern California
Additional Faculty (To Be Hired)			
1	**2**	**3**	**4**
FACULTY POSITION (FT, PT)	**COURSES TO BE TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)**	**ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed**	**OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)**

Abbreviations: (FT, PT): Full-Time, Part-Time; (D, UN, UT, G, DU): Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate, Dual: High School Dual Enrollment
Course Modality: (IP, OL, HY, OCIS): In-Person, Online, Hybrid, Off-Campus Instructional Site

C. Equipment

Will any special equipment be needed specifically for this program? **Yes ☐ No ☒**

If ***yes***, list the special equipment and include all special equipment costs in the ***Business Plan, Line 8***:

D. Facilities

Will new facilities or renovations to existing infrastructure be required specifically for the program? **Yes ☒ No ☐**

If ***yes***, describe the new facilities or renovations and include all *new* facilities and/or *renovation* costs in the ***Business Plan, Line 9***:

Modification and upgrade of an existing laboratory space will be undertaken to make it suitable for biomedical engineering instruction along with acquisition of a select number of experimental setups necessary to provide experiential learning and course enrichment opportunities for students in the new curricula. This is budgeted for in year four based on projected student numbers reaching the level at which additional laboratory space beyond the existing available space will be needed.

E. Assistantships/Fellowships

Will the institution offer any assistantships specifically for this program? **Yes ☒ No ☐**

If ***yes***, provide the number of assistantships to be offered and include all *new* costs for assistantships in the ***Business Plan, Line 10.***

Explain the function of the Assistantships (i.e., teaching, research, etc.)?:

To ensure an exceptional student experience as the Biomedical Engineering graduate student numbers increase, the projected costs include four 0.5 FTE Graduate Teaching Assistantships starting in year four. Class sizes are projected to reach twenty-five graduate students when combining numbers from all programs in year four.

F. Library

Will any **additional** library resources be purchased to support the program? **Yes ☐ No ☒**

If ***yes***, briefly describe new resources to be purchased and include the cost of new library resources in the ***Business Plan, Line 11***:

G. Accreditation Expenses

If programmatic accreditation was indicated above, please include all accreditation costs in the ***Business Plan, Line 12*** and itemize and explain below:

H. Other Costs

Please include all other costs incurred with program implementation, such as marketing or recruitment, in the ***Business Plan, Line 13*** and explain below:

Other costs will include i) buying out existing faculty time from their home departments to teach biomedical engineering program courses, ii) small instruments and supplies needed for in-class demonstrations, and iii) marketing and recruitment costs.

III. Program Revenue and Funding

A. Tuition Revenue: Please describe how you calculated the tuition revenue that appears in the ***Business Plan, Line 17***. Specifically, did you calculate using cost per credit hour or per term? Did you factor in differences between resident and non-resident tuition rates?
Note: Tuition Revenue should be proportional to total enrollment.

Tuition revenue for the PhD program was calculated using cost per term. All calculations used the lower resident tuition rate.

B. External Funding: Will the proposed program require external funding (*e.g.*, Perkins, Foundation, Federal Grants, Sponsored Research, etc.)? **Yes ☐ No ☒**

If ***yes***, please include all external funding in the ***Business Plan, Line 18*** and explain specific sources and funding below:

C. Reallocations: For each year will tuition revenue and/or external funding cover projected expenses? **Yes ☐ No ☒**

If ***not***, budget reallocation may be required. Please include all reallocations in the ***Business Plan, Line 19*** and describe below how your institution will cover any shortfalls in any given year.

In year one projected tuition revenue will not cover projected expenses. The Department of Chemical Engineering will meet initial resource requirements including covering the costs for the lecturer and the part-time academic program administrator through year three. Yearly revenue is expected to exceed yearly expenses starting in year two. By year five, total revenue generated through tuition and fees is expected to exceed total program expenses, including sufficient revenue generation to cover the year four lab renovation and other program initiation expenses.

ACADEMIC DEGREE PROGRAM BUSINESS PLAN								
INSTITUTION:	**Auburn University**							
PROGRAM NAME:	**Biomedical Engineering Doctoral Degree**						**CIP CODE:**	**14.0501**
SELECT LEVEL:	**GRADUATE (DOCTORATE)**							
ESTIMATED *NEW* EXPENSES TO IMPLEMENT PROPOSED PROGRAM								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**TOTAL**
PERSONNEL SALARIES & BENEFITS	$41,389	$37,712	$45,317	$66,398	$87,570	$98,534	$108,933	$485,853
EQUIPMENT	$0	$0	$0	$0	$0	$0	$0	$0
FACILITIES	$0	$0	$0	$0	$0	$0	$0	$0
ASSISTANTSHIPS/FELLOWSHIPS	$0	$0	$0	$36,996	$47,371	$51,750	$55,545	$191,662
LIBRARY	$0	$0	$0	$0	$0	$0	$0	$0
ACCREDITATION	$0	$0	$0	$0	$0	$0	$0	$0
OTHER COSTS	$16,233	$18,591	$22,340	$96,002	$43,169	$48,574	$53,700	$298,610
TOTAL EXPENSES	$41,389	$37,712	$45,317	$103,394	$134,941	$150,284	$164,478	**$976,125**
***NEW* REVENUES AVAILABLE FOR PROGRAM SUPPORT**								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**TOTAL**
TUITION + FEES	$22,680	$46,721	$84,214	$99,132	$165,923	$210,339	$257,271	$886,279
EXTERNAL FUNDING	-	-	-	-	-	-	-	$0
REALLOCATIONS	$30,334	$27,639	$33,212	$0	$0	$0	$0	$91,185
TOTAL REVENUES	$53,014	$74,360	$117,427	$99,132	$165,923	$210,339	$257,271	**$977,464**
ENROLLMENT PROJECTIONS								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**AVERAGE**
FULL-TIME ENROLLMENT HEADCOUNT	**No data reporting**	4	7	12	17	20	23	**13.83**
PART-TIME ENROLLMENT HEADCOUNT		0	0	0	0	0	0	**0.00**
TOTAL ENROLLMENT HEADCOUNT		4	7	12	17	20	23	**13.83**
***NEW* ENROLLMENT HEADCOUNT**		20	28	30	30	32	32	**28.67**
Validation of Enrollment			**YES**	**YES**	**YES**	**YES**	**YES**	
DEGREE COMPLETION PROJECTIONS								
Note: Do not count Lead "0"s and Lead 0 years in computing the average annual degree completions.								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**AVERAGE**
DEGREE COMPLETION PROJECTIONS	**No data reporting**	0	0	0	2	2	3	**2.33**

Graduate Curriculum Overview

Graduate Curriculum Checklist:

1. Overview ☑
2. Components ☑
3. Options (as required) ☑

1. Graduate Overview

Enter the credit hour value for all applicable components (N/A if not applicable). The credit hours MUST match the credit hours in the Curriculum Components table.

Curriculum Overview of Proposed Program	
Credit hours required in **Program Courses**	12
Credit hours in **Program Options (concentrations/specializations/tracks)**	3
Credit hours in **Program Electives**	15
Credit hours in **Required Thesis/Research**	30
Credit hours in **Required Capstone/Internship/Practicum**	N/A
Total Credit Hours Required for Completion:	**60**

Maximum number of credits that can be transferred in from another institution and applied to the program:	12
Intended program duration in semesters for full-time students:	15
Intended program duration in semesters for part-time students:	30

	YES	NO
Does the program require students to demonstrate industry-validated skills, specifically through an embedded industry-recognized certification, structured work-based learning with an enployer partner, or alignment with nationally recognized industry standards?	☐	☑

If **yes**, please explain (i.e., number of hours required, etc.):

	YES	NO
Does the program inlcude any concentrations/ tracks/ options?	☑	☐

If **yes**, please explain (i.e., define): As part of the core curriculum, students will select one course from an approved foundational graduate engineering curriculum that is aligned with the student's BS engineering expertise.

2. Graduate Components

Please provide all course information as indicated in the following table. Indicate new courses with "Y" in the associated column. If the course includes a required work-based learning component, such as an internship or practicum course, please indicate with a "Y" in the WBL column.

Insert Additional Rows as Needed				
Institution:	Auburn University			
Program Name:	Biomedical Engineering			
Program Level:	GRADUATE (DOCTORATE)			
Curriculum Components of Proposed Program				
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
Program Courses		**12**		
BMEN 6810	Fundamentals of Biomedical Engineering	3		
BMEN 6850	Quantitative Physiology	3		
BMEN 6860	Biomedical Engineering Project Management, Bioethics, and Research Skills	3	Y	
BMEN 6870	Quantitative and Mathematical Methods in BME	3	Y	
Program Options (enter total credit hours from all options below)		**3**		
Program Electives		**15**		
BMEN 6830	Cell and Tissue Engineering	3		
BMEN 6840	Computational Biomedical Engineering Fundamentals	3	Y	
BMEN 6880	Modeling and Analysis in Biomedical Engineering	3	Y	
BMEN 6890	Protein Engineering Applications	3		
BMEN 6970	Advanced Special Topics in Biomedical Engineering	3	Y	
CHEN 6800	Biochemical Engineering	3		
CHEN 6970	Quantitative Physiology	3		
CHEN 6970	Protein Engineering	3		
CHEN 6970	Cell and Tissue Engineering	3		
CHEN 6970	Biomedical Systems and Modeling	3		
CHEN 6970	Advanced Special Topics in Chemical Engineering	3		
COMP 6970	Computational Biology and Genomics	3		
COMP 6970	Special Topics	3		
ELEC 6810	Computed Imaging Systems	3		
ELEC 6830	Biomedical Applications of Electromagnetics	3		
ELEC 6970	Special Topics	3		
ELEC 7450	Digital Image Processing	3		
INSY 6650	Healthcare Systems, Culture, and Policy	3		
INSY 6080	Human Factors Engineering	3		
INSY 6670	Human Factors in Healthcare	3		
INSY 7060	Fundamentals of Ergonomics	3		
INSY 7070	Occupational Biomechanics	3		
INSY 7970	Industrial and Systems Engineering Special Topics	3		
MATL 6700	Biomaterials	3		
MATL 6720	Biomedical Applications of Polymeric Materials	3		
MATL 6970	Intermediate Special Topics in Materials Engineering	3		
MATL 7600	Biosensors	3		
MATL 7630	Nanomaterials for Biotechnology	3		
MECH 6330	Introduction to Biomechanical Engineering	3		
MECH 6970	Intermediate Special Topics in Mechanical Engineering	3		
Required Thesis/Research		**30**		
BMEN 7950	Graduate Seminar	1		

BMEN 8990	Research and Dissertation	varies		
BMEN 7900	Independent Study	varies		
Capstone/Internship/Practicum		**N/A**		
	Total Credit Hours Required for Completion:	**60**		

3. Graduate Options

Please provide all concentrations/ tracks/ options in the following table. Indicate new courses with "Y" in the associated column. If the course includes a required work-based learning component, such as an internship or practicum course, please indicate with a "Y" in the WBL column.

Insert Additional Rows and Tables as Needed

Option Name:	**Chemical Engineering Foundation Core Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
CHEN 7100	Transport Phenomena	3		
CHEN 7200	Chemical Engineering Thermodynamics	3		
CHEN 7250	Chemical Reaction Engineering	3		
	Total Option Credit Hours Required for Completion:	3		

Option Name:	**Computer Science and Software Engineering Foundation Core Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
COMP 7270	Advanced Algorithms	3		
COMP 6120	Database Systems I	3		
COMP 6600	Artificial Intelligence	3		
COMP 6630	Machine Learning	3		
COMP 6130	Data Mining	3		
	Total Option Credit Hours Required for Completion:	**3**		

Option Name:	**Electrical Engineering Foundation Core Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
ELEC 7450	Digital Image Processing	3		
ELEC 6810	Computed Imaging Systems	3		
	Total Option Credit Hours Required for Completion:	**3**		

Option Name:	**Industrial and Systems Engineering Foundation Core Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
INSY 6600	Engineering Economic Systems	3		
INSY 7300	Advanced Engineering Statistics	3		
INSY 7420	Linear Programming and Network Flows	3		
	Total Option Credit Hours Required for Completion:	**3**		

Option Name:	**Materials Engineering Foundation Core Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
MATL 6100	Thermodynamics of Material Systems	3		

MATL 6200	Materials Characterization	3		
Total Option Credit Hours Required for Completion:		**3**		

Option Name:	**Mechanical Engineering Foundation Core Option**

Course Number	Course Name	Credit Hours	New? (Y)	WBL? (Y)
MECH 7110	Advanced Fluid Mechanics	3		
MECH 7010	Advanced Thermodynamics	3		
Total Option Credit Hours Required for Completion:		3		

Option Name:	**Aerospace Engineering Core Option**

Course Number	Course Name	Credit Hours	New? (Y)	WBL? (Y)
AERO 7170	Fundamentals of Fluids	3		
Total Option Credit Hours Required for Completion:		3		

Biomedical Engineering (BMEN) Ph.D. Curriculum

The required coursework includes 60 credit hours, comprised of 30 graded credit hours and 30 ungraded research and dissertation or graduate seminar credit hours. Two semesters of graduate teaching assistantship are also required to solidify core knowledge.

The PhD qualifying examination consists of a written NIH-style proposal followed by a preliminary oral examination administered by the research advisory committee. The research advisory committee is comprised of at least four faculty members, including at least three engineering faculty members, one of whom is the chair or co-chair of the committee. The student advances to candidacy upon successful completion of the PhD qualifying and preliminary oral examinations. Successful completion requires unanimous approval of the research advisory committee. The PhD final defense consists of a written dissertation followed by a final oral examination administered by the research advisory committee. A university reader will also be appointed to review the dissertation. Successful completion again requires unanimous approval of the research advisory committee.

Required Graded Coursework for BMEN PhD (30 hours)

BMEN PhD Core (15 hours)

BMEN 6810 Fundamentals of Biomedical Engineering -or- BMEN 6840 Computational Biomedical Engineering Fundamentals (3 hours)
BMEN 6850 Quantitative Physiology (2 hours lecture, 1 hour lab)
BMEN 6860 Biomedical Engineering Project Management, Bioethics, and Research Skills (3 hours)
BMEN 6870 Quantitative and Mathematical Methods in BME (3 hours)
One course selected from approved foundational graduate engineering curriculum aligned with the student's BS engineering expertise (3 hours)*

Engineering Technical Electives (15 hours)

Five 6000-8000 level graduate courses should be selected with approval from the research advisor and the graduate program advisor.

Required Non-graded Coursework for BMEN PhD (30 hours)

BMEN 8990 Research and Dissertation (credit hours vary per semester)
BMEN 7950 Graduate Seminar (required at least once annually when offered)
BMEN 7900 Independent Study (credit hours vary)

*Options include: CHEN 7100 Transport Phenomena, CHEN 7200 Chemical Engineering Thermodynamics, CHEN 7250 Chemical Reaction Engineering, COMP 7270 Advanced Algorithms, COMP 6120 Database Systems I, COMP 6600 Artificial Intelligence, COMP 6630 Machine Learning, COMP 6130 Data Mining, ELEC 7450 Digital Image Processing, ELEC 6810 Computed Imaging Systems, INSY 6600 Engineering Economic Systems, INSY 7300 Advanced Engineering Statistics, INSY 7420 Linear Programming and Network Flows, MATL 6100 Thermodynamics of Materials Systems, MATL 6200 Materials Characterization, MECH 7110 Advanced Fluid Mechanics, MECH 7010 Advanced Thermodynamics, and AERO 7170 Fundamentals of Fluids.

Biomedical Engineering PhD Plan of Study Grid

First Year			
Fall	**13**	**Spring**	**10**
BMEN 6810 Fundamentals of Biomedical Engineering -or- BMEN 6840 Computational Biomedical Engineering Fundamentals	3	BMEN 6850 Quantitative Physiology	3
Foundational Graduate Engineering Course	3	BMEN 6860 Biomedical Engineering Project Management, Bioethics, and Research Skills	3
BMEN Technical Elective 1	3	BMEN 6870 Quantitative and Mathematical Methods in Biomedical Engineering	3
BMEN Technical Elective 2	3	BMEN 8990 Research and Dissertation	1
BMEN 7950 Graduate Seminar	1		

First Year Summer Semester	
Summer	**4**
BMEN Technical Elective 3	3
BMEN 8990 Research and Dissertation	1
**The qualifying exam should be completed by the end of the third semester.*	

Second Year			
Fall	**9**	**Spring**	**9**
BMEN Technical Elective 4	3	BMEN Technical Elective 5	3
BMEN 7950 Graduate Seminar	1	BMEN 7950 Graduate Seminar	1
BMEN 8990 Research and Dissertation	5	BMEN 8990 Research and Dissertation	5

Second Year Summer Semester	
Summer	**1**
BMEN 8990 Research and Dissertation	1
**The preliminary exam should be completed by the end of the sixth semester.*	

Third Year			
Fall	**3**	**Spring/Summer**	**3**
BMEN 7950 Graduate Seminar	1	BMEN 7950 Graduate Seminar	1
BMEN 8990 Research and Dissertation	2	BMEN 8990 Research and Dissertation	2

Fourth Year			
Fall	**2**	**Spring/Summer**	**2**
BMEN 7950 Graduate Seminar	1	BMEN 7950 Graduate Seminar	1
BMEN 8990 Research and Dissertation	1	BMEN 8990 Research and Dissertation	1

Fifth Year			
Fall	**2**	**Spring/Summer**	**2**
BMEN 7950 Graduate Seminar	1	BMEN 7950 Graduate Seminar	1
BMEN 8990 Research and Dissertation	1	BMEN 8990 Research and Dissertation	1
UNIV 4AA0 Graduation	0		

KEY: BMEN Ph.D. Core Courses, Technical Electives, Ungraded Courses