Alabama Commission on Higher Education

Accessibility. Affordability. Coordination.

Proposal for a New Degree Program

I. Information and Rationale

A. Primary Contact Information

Institution: University of Alabama

Contact: Carmen Coleman

Title: Academic Program Development Specialist, Office for Academic Affairs

Email: crjones18@ua.edu

Telephone: (205) 348-3439

B. Program Information

Date of Proposal Submission: February 2025

Award Level: Master's Degree

Award Nomenclature (e.g., BS, MBA): M.S.

Field of Study/Program Title: Biomedical Engineering

CIP Code (6-digit): 14.0501

Proposed Delivery Method: In person

C. Administration of the Program:

Name of Dean and College: College of Engineering, Dean Clifford Henderson

Name of Department/Division: Department of Chemical and Biological Engineering

Name of Chairperson: Heath Turner

Name of Representative for Proposal (if not chair): Yuping Bao

D. Implementation Information

Proposed Program Implementation Date: 8/15/2027

Anticipated Date of Approval from Institutional Governing Board: June 2025

Anticipated Date of ACHE Meeting to Vote on Proposal: June 2025

SACSCOC Sub Change Requirement (Notification, Approval, or NA): NA

Other Considerations for Timing and Approval (e.g., upcoming SACSCOC review):

E. Concise Program Description

1. Briefly describe the purpose of the proposed program.

   The objective of the proposed Biomedical Engineering (M.S.) program is to train students with breadth and depth of knowledge related to the biomedical engineering field, to familiarize students with emerging techniques, tools, and materials in the field of biomedical engineering, and to prepare students as professionals in biomedical, biotechnology, and pharmaceutical industries. Specifically, this M.S. program includes 30 credits of coursework and a Capstone Experience. As students progress through the program, they will also have to meet other requirements besides satisfactory completion of courses, such as participation in graduate research seminars, no course receiving a grade below C, no more than 6 hours of course credits of Independent Study, etc. The core courses in the program will provide a common foundation for all students. For example, Biochemical Engineering is designed to familiarize students with the fundamentals of biomolecules, cells, and biological processes, with a balance between biomedical engineering and biotechnology knowledge. The core mathematics requirement offers several choices for students from a physical science, engineering, mathematics, or life sciences background. Biostatistics (3 credits) helps integrate the curriculum for students with life science and engineering backgrounds, permitting engineers to appreciate how organisms function from the organ/system perspective and giving life scientists a more rigorous quantitative approach. Elective courses help students attain depth in focused areas. In particular, our program will strongly focus on Biomaterials: Tissue Engineering, Drug Delivery, Polymers/ Plastics, Nanotechnology, and Bioprocessing. The required Capstone Experience is designed to broaden and enhance the student learning experience through (1) a mentored grading experience (CHE 593) to enhance learning in biomedical engineering topics, and (2) the preparation and delivery of a technical seminar (CHE 595) to the departmental faculty and graduate students focused on a biomedical engineering related topic. The Capstone Experience can also include hands-on research experience in faculty laboratories, internships and shadowing opportunities involving biomedical engineering companies and health professionals, technical literature reviews within the biomedical engineering field, development of biomedical engineering design models, etc.

2. Describe, if applicable, general opportunities for work-based and/or experiential learning within the proposed program.

   Work-based or experiential learning is not required.

3. Provide a brief statement regarding how the program's purpose is related to the mission and goals of the department, college, and University.

   In line with the missions and goals of The University of Alabama, (e.g. advance people through the creation and dissemination of knowledge with an emphasis on quality programs in research and teaching) this Biomedical Engineering (M.S.) program will train students with breadth and depth of knowledge related to the biomedical field. The creation of such a program is driven by the strong interests of current and prospective students and aligns with a large fraction (~30%) of the faculty research areas within the Department of Chemical and Biological Engineering. The establishment of this Biomedical Engineering (M.S.) program also directly supports the strategic plan of the Alabama Life Research Institute (ALRI) by allowing students to take research credits through the Institute. One of the main goals of the ALRI is to develop new therapeutics and delivery methods and to translate these new therapeutics into clinical studies. Our proposed Biomedical

Engineering (M.S.) program is multi-disciplinary and supports ALRI's mission of creating training programs and initiatives that develop the skills of students and researchers.

F. Specific Rationale (Strengths) for the Program

List 3 – 5 strengths of the proposed program as a specific rationale for recommending approval of this proposal.

1. The Department of Chemical and Biological Engineering has diverse faculty research areas related to biomedical engineering, such as cell-material interactions, drug discovery and delivery, pharmaceutic development and formulations, synthetic biology, cellular tissue models, stem cells, cancer biotechnology, and pain management.
2. Several elective graduate-level courses in biomedical engineering are already being offered, including CHE 518 Tissue Engineering, CHE 516 Stem Cell Engineering, CHE 592 Cancer Biotechnology, and CHE 592 Metabolic Engineering. These electives are regularly offered, and they have substantial enrollments.
3. Although the Department of Chemical and Biological Engineering has diverse research areas, there is already a strong synergy of faculty expertise in biomaterials, cellular engineering, and cell-biomaterials interactions. These are core topics within a biomedical engineering curriculum.

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. (external letters of support are not required, but encouraged)

1. Evonik
2. Pfizer

II. Background with Context

A. Student Learning Outcomes

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

The students who complete the Biomedical Engineering (M.S.) program will be able to:

1. Demonstrate a breadth of knowledge in biomedical engineering fundamentals appropriate for the discipline and in-depth knowledge of a chosen specialization, such as biomaterials.
2. Communicate technical biomedical engineering information effectively.
3. Evaluate and assimilate scientific and technical literature within the biomedical engineering field.
4. Solve complex biomedical engineering problems and tasks, and use engineering, science, and statistics principles to justify recommendations.

B. 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 (B.S., M.S., Ph.D.)	University of Alabama at Birmingham	See below*

The UAB Biomedical Engineering (M.S.) program has several focus areas, including biomedical imaging, biomedical implants and devices, cardiac electrophysiology, multiscale computational modeling, and tissue engineering & regenerative medicine.

At UA, our proposed Biomedical Engineering (M.S.) program will focus on biomaterials, cell engineering, and biopharmaceutical processes. Therefore, the scope of our coursework will be unique, as well as the expertise of the faculty teaching the courses.

C. Relationship to Existing Programs within the Institution

1. Is the proposed program associated with any existing offerings within the institution, including options within current degree programs? **Yes ☒ No ☐**

   (Note: Most new programs have some relationship to existing offerings, *e.g.*, through shared courses or resources). If yes, complete the following table. 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.

Related Degree Program Level	Related Degree Program Title	Explanation of the Relationship Between the Programs
Graduate level (MS. And Ph.D.)	Chemical Engineering	shared courses or resources
Graduate level (MS. And Ph.D.)	Biology	shared courses or resources
Graduate level (MS. And Ph.D.)	Mechanical Engineering	shared courses or resources

2. Will this program replace any existing programs or specializations, options, or concentrations? **Yes ☐ No ☒**

   If yes, please explain.

3. Will the program compete with any current internal offerings? **Yes ☐ No ☒**

   If yes, please explain.

   If applicable, attach a letter of support from the competing or overlapping department(s)

D. Collaboration

Have collaborations with other institutions or external entities been explored? **Yes ☐ No ☒**

If yes, provide a brief explanation indicating those collaboration plan(s) for the proposed program.

Have any collaborations within your institution been explored? **Yes ☒ No ☐**

If yes, provide a brief explanation indicating those collaboration plan(s) for the proposed program.
If not, provide a brief explanation why collaboration is not being explored, including impact on the students and University.

We are seeking collaborations with several internal programs for additional coursework that would align with the proposed program. For example, we are working on adding Biomechanics (CHE 592) as a new elective by working with one of our Department of Chemical and Biological Engineering adjunct faculty, Prof. Jason Zhang, who is a tenure-track faculty member in the Department of Mechanical Engineering.

E. Specialized Accreditation

1. Will this program have any external accreditation requirements in addition to the institution's SACSCOC program requirements? **Yes ☐ No ☒**

   If yes, list the name(s) of the specialized accrediting organization(s) and the anticipated timeframe of the application process.

2. Does your institution intend to pursue any other non-required accrediting organizations for the program?* **Yes ☐ No ☒**

   If yes, list the name(s) of the organization(s) and the purpose of the pursuit.

   If there are plans to pursue non-required external accreditation at a later date, list the name(s) and why the institution is not pursuing them at this time.

   Note: Check *No* to indicate that non-required external accreditation will not be pursued, which requires no explanation.

F. Professional Licensure/Certification

Please explain if professional licensure or industry certification is required for graduates of the proposed program to gain entry-level employment in the occupations selected. Be sure to note which organization(s) grants licensure or certification.

Neither professional licensure nor industry certification is required for graduates to gain entry-level employment.

G. Additional Education/Training

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

Further education/training is not required for graduates to gain entry-level employment.

H. Admissions

Will this program have any additional admissions requirements beyond the institution's standard admissions process/policies for this degree level? **Yes ☐ No ☒**
If yes, describe any other special admissions or curricular requirements, including any prior education or work experience required for acceptance into the program.

I. Mode of Delivery

Provide the planned delivery format(s) (*i.e.*, in-person, online, hybrid) of the program as defined in policy along with the planned location(s) at which the program will be delivered (*i.e.*, on-campus and/or at specific off-campus instructional site(s)). Please also note whether any program requirements can be completed through competency-based assessment.

It is intended that the Biomedical Engineering (M.S.) program would be delivered exclusively in person. Many of the assignments in our existing courses related to the proposed program are designed to include team discussion, in person exams, and interactive in class assignments, etc.

No program requirement can be completed through competency-based assessment.

J. Projected Program Demand (Student Demand)

Briefly describe the primary method(s) used to determine the level of student demand for this program using evidence, such as enrollments in related coursework at the institution, or a survey of student interest conducted (indicate the survey instrument used), number and percentage of respondents, and summary of results.

In spring 2024, we surveyed our current chemical engineering students whether they would be interested in pursuing a Biomedical Engineering (M.S.) degree if it is offered. The responses were overwhelmingly positive with 53 of our current students indicating "Definitely YES" and 23 additional students indicating "Maybe YES". Additionally, during spring of 2024, we conducted surveys of students' future career interests within the chemical engineering program. Among the 285 students surveyed, over 50% of the students plan to pursue a career in Biotechnology, Healthcare/Medicine, or Pharmaceuticals. A BME MS program will further provide students with additional opportunities to meet the need and interests of current students.

Furthermore, in conjunction with the accelerated master program (AMP), a BS in Chemical Engineering/MS in BME will not only attract existing students to pursue a MS degree but also serve as a recruiting tool for future students. Based on surveys of students in our CHE 125 "Introduction to Chemical Engineering" course, approximately 60% of the entering freshmen are interested in pursuing a medical-related career (medical, dental, pharmaceuticals, etc.). This is based on a ~90% response rate. Our incoming class in the Department of Chemical and Biological Engineering is currently approximately 150 students. During on-site prospective student visits, many of the visiting students indicate their strong interest in a Biomedical Engineering degree option at UA. Many prospective students decide to go elsewhere since we do not have an option for students to obtain a Biomedical Engineering degree at UA (however, we are not able to obtain data to quantify the number of students lost to other schools). We currently offer a Biological Engineering concentration within our chemical engineering (B.S.) degree program, which was recently launched in Fall 2021. Although it is a very new concentration, we already have 54 students in the program. Besides AMP with BS in Chemical Engineering/MS in BME, we also received multiple requests from other engineering disciplines (*e.g.*, mechanical engineering) to inquiry the possibility to obtain a MS in BME through the AMP program.

Overall, our data supports strong interest in a Biomedical Engineering (M.S.) degree program, as well as careers in this field.

K. Standard Occupational Code System

1. 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.

   A list of Alabama's *In-Demand Occupations* is available at https://www.ache.edu/index.php/policy-guidance/.

   List the SOC and description.

SOC 1 (required): 17-2031.00	Bioengineers and Biomedical Engineers
SOC 2 (required): 19-4021.00	Biological Technicians
SOC 3 (required): 29-2011.00	Medical and Clinical Laboratory Technologists

   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).

   In Alabama, as in many other states, there is a growing need for biomedical engineers to serve in the general area of life science and engineering. The workforce training in biomedical engineering directly contributes to the needs of Alabama's *In-Demand Occupations* and aligns with EDPA where Alabama's multifaceted life sciences industry generates $7.3 billion in economic activity annually, while supporting 780 companies and nearly 48,000 direct and indirect jobs across the state. Several factors contribute to the need for biomedical engineers. First, Alabama has a thriving healthcare industry with numerous hospitals, clinics, research institutions, and medical device companies. As an example, a strong letter of support has been provided from Evonik, which is a large chemical and healthcare company (annual sales of $15-

20 billion) with major operations in Alabama. As the healthcare sector expands to meet the needs of the population, there is an increasing demand for biomedical engineers to develop innovative medical devices, improve healthcare delivery systems, and conduct research to address medical challenges. Second, Alabama is home to several universities and research institutions conducting cutting-edge biomedical research. Training in biomedical engineering can directly contribute to research projects focused on areas such as tissue engineering, biomaterials, medical imaging, and biomedical instrumentation.

Healthcare Innovation Initiatives: There is a growing emphasis on healthcare innovation and entrepreneurship in Alabama, with initiatives aimed at fostering collaboration between academia, industry, and healthcare providers to develop and commercialize new medical technologies. Biomedical engineers with entrepreneurial skills and a passion for innovation are in demand to drive these initiatives forward. Alabama has several government and military healthcare facilities, including Veterans Affairs (VA) hospitals and military medical centers. Biomedical engineers may find employment opportunities in these institutions, supporting healthcare delivery, medical research, and technology development for military and veteran populations.

Biomedical engineers with a strong educational background, relevant skills, and a passion for improving healthcare outcomes are well-positioned to contribute to the state's healthcare ecosystem.

2. Describe how the proposed program prepares graduates to seek employment in the occupations (SOC codes) identified. Be specific in how the proposed program is related to the SOC codes listed above.

   To prepare graduates to be competitive in the occupations listed above, our proposed program offers a combination of foundational knowledge, technical skills, practical experience, and interdisciplinary training. The core and elective courses will provide the students with comprehensive knowledge in the areas of bioengineering and biomedical engineering (SOC1). We will also offer students opportunities to engage in hands-on laboratory research on various biomedical-related projects, which will prepare the students in the area of biological technicians (SOC2) and Medical and Clinical Laboratory Technologists (SOC3).

III. Curriculum Information for Proposed Degree Program

A. Program Completion Requirements: Enter the credit hour value for all applicable components (enter N/A if not applicable).

Curriculum Overview of Proposed Program	
Credit hours required in **general education**	NA
Credit hours required in **program courses**	16
Credit hours in **program electives/concentrations/tracks**	14
Credit hours in **free electives**	0
Credit hours in **required research/thesis**	0
Total Credit Hours Required for Completion	**30**

Note: The above credit hours **MUST** match the credit hours in the *Curriculum Components of Proposed Program* table in Section V.G.

B. Maximum number of credits that can be transferred in from another institution and

applied to the program: **9 hours of elective credits**

C. Intended program duration in semesters for full-time students: **2-4 semesters**

D. Intended program duration in semesters for part-time students: **5-7 semesters**

E. Does the program require students to demonstrate industry-validated skills, specifically through an embedded industry-recognized certification, structured work-based learning with an employer partner, or alignment with nationally recognized industry standards? **Yes ☐ No ☒**

If yes, explain how these components fit with the required coursework.

F. Does the program include any concentrations? **Yes ☐ No ☒**

If yes, provide an overview and identify these courses in the *Electives/Concentrations/Tracks* section in the Curriculum Components of Proposed Program Table in Section V.G.

G. 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.

Program Name:	**Biomedical Engineering (M.S.)**			
Program Level:				
Curriculum Components of Proposed Program				
Course Number	**Course Title**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
General Education Courses *(Undergraduate Only)*				
Program Courses				
CHE 551	Advanced Thermodynamics	3		
CHE 552	Advanced Transport	3		
CHE 545	Biochemical Engineering	3		
CHE 5xx	Biostatistics	3	Y	
CHE 593	Practicum	3		
CHE 595	Graduate Seminar	1		
Program Electives/Concentrations/Tracks (select 14 hours)				
CHE 518	Tissue Engineering	3		

CHE 516	Stem Cell Bioengineering	3		
CHE 592	Cancer Bioengineering	3		
CHE 592	Microbial Engineering	3		
CHE 5xx	Biomaterials	3	Y	
CHE 5xx	Biomechanics	3	Y	
CHE 598	Non-thesis research (up to 6 hours)	<6		
Research/Thesis				
	***Total Credit Hours Required for Completion**	**30**		

***Note**: The total credit hours should equal the total credit hours in the Curriculum Overview table (V.B, p. 9).

IV. Program Resource Requirements

A. Proposed Program Faculty*

Current Faculty and Faculty to Be Hired

Complete the following **New Academic Degree Proposal 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)
Yuping Bao (FT)	1. **Tissue Eng. (ChE518, 3 hours, G)**, Fall (2009-2015, 2021, 2022), Spring (2020, 2021) 2. **Biochemical Eng. (CHE545, 3 hours, G),** Spring (2009-2016) 3 **Nanomedicine** (CHE 325,1 hour, U) Fall (2012, 2013) Spring (2016, 2022)	Ph.D. in Materials Science and Engineering, Bioengineering, University of Washington, **Coursework**: Biomaterials, Protein Engineering, Biointerface, Nanomedicine.	Conducted postdoctoral research in Biomaterials at the center for integrated nanotechnology (Los Alamos National laboratory).
Chris Brazel (FT)	**1.Biochemical Eng. (CHE545, 3 hours, G),** Fall Spring **2. Nanomedicine** (CHE 325,1 hour, U) Fall (2012, 2013)	MS & PhD Chemical Engineering, Purdue	NA

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)
John Kim (FT)	**1. Biochemical Eng. (CHE545, 3 hours, G),** Fall Spring 2015, Summer (2015, 2023), Fall (2024) **2. Stem Cell Eng. (CHE 516, 3 hours, G)**	Ph.D. in Biochemical Engineering from the University of Maryland at Baltimore County. Coursework: ENCH 660 - Regulatory Issues in Biotechnology ENCH 662 - Good Manufacturing Practices for Bioprocesses ENCH 664 - Quality Control and Quality Assurance for Biotechnology Products ENCH 666 - Biotechnology GMP Facility Design, Construction and Validation ENCH 682 - Biochemical Engineering ENCH 693 - Introduction to Biomedical Engineering ENCH 761 - Enzyme Engineering ENCH 762 - Advanced Biochemical Engineering ENCH 766 - Tissue Engineering ENCH 768 - Protein Engineering ENCH 772 - Advanced Biochemical Engineering: Upstream Processes	Post-doctoral training in stem cell biology and neuro-oncology
Shreyas Rao (FT)	1. **Tissue Eng. (ChE518, 3 hours, G)**, Fall 2023, Spring (2018, 2024) 2. **Cancer Bioeng (CHE592, 3 hours, G)** Spring 2023, Fall (2024)	Ph.D. in Chemical Engineering from Ohio State University, Coursework: Principles of Biochemical Engineering Cell and Tissue Engineering Fundamentals of Biomaterials Soft Tissue Biomaterials Molecular Informatics	Postdoctoral training in biomaterials
Ryan Summers (FT)	1. **Biochemical Eng. (CHE545, 3 hours, G),** Fall (2021-2023) **2. Metabolic Eng. (CHE 592, 3 hours, G)** Fall 2017, Spring (2020, 2024)	PhD Chemical and Biochemical Engineering, University of Iowa Coursework: Biochemical Engineering Environmental Microbiology	NA
Chao Zhao (FT)	1. **Tissue Eng. (ChE518, 3 hours, G)**, Fall (2023, 2024)	Ph.D. in Chemical Engineering, University of Akron I have taken the graduate course: Polymeric Biomaterials	3 years of postdoc training at the University of Michigan in tissue engineering.
Mingfei Zhao (FT)	Biomechanics (3 hours, G)	Ph.D. in Mechanical Engineering from SUNY Binghamton	Dr. Zhao completed her postdoctoral training with the Theoretical Biology and Biophysics Group at Los Alamos National Lab. During her postdoc there, she specialized in modeling and comprehending the mechanical properties of biological systems, such as proteins and lipid membranes. With this background, she is well-equipped to teach biomechanics, a subfield of biophysics, at an advanced level.
Janson Zhang (FT Adjunct)	Biomechanics of Human Movement (ME448/548, 3 hours, UG/G, Spring 2025, 2026).	Ph.D. in Biomedical Engineering from UNC-Chapel Hill and NC State University **Coursework**: BME 790 - Adv Spc Topics, ME 802 - Adv BME Seminar, PHY 503 - Gen Physiology I.	Post-doc training in Advanced Rehabilitation Research and Training as a research fellow, in the Closed Loop Engineering for Advanced Rehabilitation, UNC-Chapel Hill & NC State University

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)
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)
Open Position (1)			
Open Position (2)			

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
Courses Taught/To be Taught – For a substantive change prospectus/application, list the courses *to be taught*, not historical teaching assignments.

B. 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	9	1	10
	Part-Time Faculty	0	0	0
	Administration	0	0	0
	Support Staff	2	0	2
**New To Be Hired	Full-Time Faculty	0	0	0
	Part-Time Faculty	0	0	0
	Administration			
	Support Staff			
			Personnel Total	12

****Note**: **Any new funds** designated for compensation costs (Faculty (FT/PT), Administration, and/or Support Staff to be Hired) **should be included** in the **New Academic Degree Program Business Plan Excel file**. Current personnel salary/benefits (Faculty (FT/PT), Administration, and/or Support Staff) **should not be included** in the **Business Plan**.

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.

We currently have seven full-time departmental faculty who could teach the necessary courses, plus one external supporting faculty, plus two open faculty positions who will be hired in this area, resulting in a total of 10 faculty positions to support this degree program. Please note that these two potential hires have already been approved and are not contingent on the new program. Many of the anticipated courses are already being offered as electives within the Department of Chemical and Biological Engineering. Currently, we have sufficient staff to handle the administrative expectations of the proposed degree program. However, if the program grows significantly in enrollment, we may need to consider adding an additional (possibly part-time) administrative assistant.

C. Equipment

Will any special equipment be needed specifically for this program? **Yes ☐ No ☒**
If *yes*, list the special equipment. Special equipment cost should be included in the **New Academic Degree Program Business Plan Excel file.**

D. Facilities

Will any new facilities be required specifically for the program? **Yes ☐ No ☒**

If *yes*, list only **new** facilities. New facilities cost should be included in the **New Academic Degree Program Business Plan Excel file.**

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

If *yes*, list the renovations. Renovation costs should be included in the **New Academic Degree Program Business Plan Excel file.**

E. Assistantships/Fellowships

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

If *yes*, how many assistantships will be offered?

The expenses associated with any *new* assistantships should be included in the **New Academic Degree Program Business Plan Excel file.**

F. Library

Provide a brief summarization (one to two paragraphs) describing the current status of the library collections supporting the proposed program.

UA library provides a wide range of resources and support services for the proposed biomedical engineering program. For example, UA library maintains a nice collection of journals related to biomedical engineering, such as biomaterials, IEEE Transactions on Biomedical Engineering, Journal of biomechanical engineering, biomechanics, and digital databases (e.g., PubMed, Web of Science, and Scopus). In addition, UA library also has a comprehensive collection of textbooks covering fundamental and advanced topics in biomedical engineering, such as biomaterials, introduction to molecular biology, genomics, and proteomics for biomedical engineers, biochemical engineering, and Metabolic engineering: principles and methodologies. UA Library also offers great access for eBooks via Scout and maintains an active interlibrary loan system (https://ua.illiad.oclc.org/illiad/) for accessing journals and books that are not available at UA library.

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

If *yes*, briefly describe how any deficiencies will be remedied, and include the cost in the **New Academic Degree Program Business Plan Excel file.**

G. Accreditation Expenses

Will the proposed program require accreditation expenses? **Yes ☐ No ☒**

If *yes*, briefly describe the estimated cost and funding source(s) and include cost in the **New Academic Degree Program Business Plan Excel file.**

H. Other Costs

Please explain any other costs to be incurred with program implementation, such as marketing or recruitment costs. Be sure to note these in the **New Academic Degree Program Business Plan Excel file.**

I. Revenues for Program Support

Will the proposed program require budget reallocation? **Yes ☐ No ☒**

If *yes*, briefly describe how any deficiencies will be remedied and include the revenue in the **New Academic Degree Program Business Plan Excel file.**

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

If *yes*, list the sources of external funding and include the revenue in the **New Academic Degree Program Business Plan Excel file.**

Please describe how you calculated the tuition revenue that appears in the **New Academic Degree Program Business Plan Excel file.** Specifically, did you calculate using cost per credit hour or per term? Did you factor in differences between resident and non-resident tuition rates?

The revenues were calculated with current tuition rates referencing our current enrollment for residents vs non-residents. Currently, all our M.S. students in the Department of Chemical and Biological Engineering are domestic with about 60% of those students being from out of state.

ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

INSTITUTION:	**The University of Alabama**		
PROGRAM NAME:	**Biomedical Engineering M.S.**	**CIP CODE:**	14.0501
SELECT LEVEL:	**GRADUATE (MASTER'S)**		

ESTIMATED *NEW* EXPENSES TO IMPLEMENT PROPOSED PROGRAM

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	TOTAL
FACULTY	$0	$0	$0	$0	$0	$0	$0	$0
ADMINISTRATION/STAFF	$0	$0	$0	$0	$0	$0	$0	$0
EQUIPMENT	$0	$0	$0	$0	$0	$0	$0	$0
FACILITIES	$0	$0	$0	$0	$0	$0	$0	$0
ASSISTANTSHIPS/FELLOWSHIPS	0	$0	$0	$0	$0	$0	$0	$0
LIBRARY	$0	$0	$0	$0	$0	$0	$0	$0
ACCREDITATION AND OTHER COSTS	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL EXPENSES	$0	$0	$0	$0	$0	$0	$0	**$0**

NEW REVENUES AVAILABLE FOR PROGRAM SUPPORT

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	TOTAL
REALLOCATIONS								$0
EXTERNAL FUNDING								$0
TUITION + FEES		$59,700	$95,520	$119,400	$143,280	$179,100	$179,100	$776,100
TOTAL REVENUES	$0	$59,700	$95,520	$119,400	$143,280	$179,100	$179,100	**$776,100**

ENROLLMENT PROJECTIONS

Note: "New Enrollment Headcount" is defined as unduplicated counts across years.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	AVERAGE
FULL-TIME ENROLLMENT HEADCOUNT	No data reporting	5	8	10	12	15	15	**10.83**
PART-TIME ENROLLMENT HEADCOUNT								**0.00**
TOTAL ENROLLMENT HEADCOUNT		5	8	10	12	15	15	**10.83**
***NEW* ENROLLMENT HEADCOUNT**		3	3	7	9	11	11	**7.33**
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	5	7	8	11	13	**8.80**

THE UNIVERSITY OF ALABAMA

Resolution

Granting Approval of and Permission to Submit to the Alabama Commission on Higher Education (ACHE) a Proposal for a Master of Science (M.S.) degree in Biomedical Engineering (CIP Code 14.0501) in the Department of Chemical and Biological Engineering in the College of Engineering

WHEREAS, the Department of Chemical and Biological Engineering currently offers degrees in Chemical Engineering (B.S., M.S.) with a collection of courses in Chemical and Biological Engineering related to Chemical and Biological processes, theories and practices of chemical engineering principles, and concentrated training opportunities in biological engineering areas; and

WHEREAS, continued post-graduate study in these areas will help prepare students for study in medical school and Ph.D. programs in Chemical Engineering, Biomedical Engineering; and

WHEREAS, the proposed Biomedical Engineering (M.S.) program will provide training with breadth and depth of knowledge related to the biomedical field to prepare students for professional practice in biomedical or biotechnology industries; and

WHEREAS, the proposed Biomedical Engineering (M.S.) program will be one of the two graduate Biomedical Engineering programs in the state of Alabama; and

WHEREAS, this program builds on the widely recognized skills and expertise of the current faculty in the Department of Chemical and Biological Engineering;

NOW, THEREFORE IT BE RESOLVED by the Board of Trustees of The University of Alabama that it grants approval of and permission to submit to the Alabama Commission on Higher Education (ACHE) a Proposal for a Master of Science (M.S.) degree in Biomedical Engineering (CIP Code 14.0501) in the Department of Chemical and Biological Engineering in the College of Engineering at The University of Alabama.

THE UNIVERSITY OF ALABAMA | Office of the President

November 11, 2024

Interim Chancellor Sid Trant
The University of Alabama System
500 University Boulevard East
Tuscaloosa, Alabama 35401

Dear Interim Chancellor Trant:

I am pleased to endorse the recommendation from Executive Vice President and Provost James Dalton and Deans Susan Carvalho of the Graduate School and Clifford Henderson of the College of Engineering for approval of the attached proposal for a Master of Science (M.S.) degree in Biomedical Engineering (CIP Code 14.0501). The proposed M.S. in Biomedical Engineering builds on the College of Engineering's integration of biological principles into its curriculum, preparing students for diverse careers in biomedical engineering and related fields such as medicine. With strong department and college support, this program reflects national trends in expanding biomedical engineering education and capitalizes on the department's existing faculty expertise and student interest in the field. Formalizing this degree will recognize students' specialized training, enhance career opportunities, and attract a more diverse student body to the program.

If you approve of this proposal, I would appreciate you forwarding this request to the Board of Trustees at your earliest convenience.

Sincerely,

Stuart R. Bell
President

Enclosure

c: Executive Vice President and Provost James Dalton
Dean Clifford Henderson
Dean Susan Carvalho

203 Rose Administration Building | Box 870100 | Tuscaloosa, AL 35487-0100 | 205-348-5100 | Fax 205-348-7238
president@ua.edu | http://www.ua.edu

THE UNIVERSITY OF ALABAMA | Office for Academic Affairs

November 11, 2024

President Stuart R. Bell
The University of Alabama
203 Rose Administration
Tuscaloosa, Alabama 35487

Dear President Bell:

I am pleased to endorse the recommendation from Deans Susan Carvalho of the Graduate School and Clifford Henderson of the College of Engineering for approval of the attached proposal for a Master of Science (M.S.) degree in Biomedical Engineering (CIP Code 14.0501). The proposed M.S. in Biomedical Engineering builds on the College of Engineering's integration of biological principles into its curriculum, preparing students for diverse careers in biomedical engineering and related fields such as medicine. With strong department and college support, this program reflects national trends in expanding biomedical engineering education and capitalizes on the department's existing faculty expertise and student interest in the field. Formalizing this degree will recognize students' specialized training, enhance career opportunities, and attract a more diverse student body to the program.

If you approve of this proposal, I would appreciate you forwarding this information item to Interim Chancellor Trant at your earliest convenience.

Sincerely,

James T. Dalton, Ph.D.
Executive Vice President and Provost

Enclosure

c: Dean Clifford Henderson
Dean Susan Carvalho

THE UNIVERSITY OF ALABAMA | College of Engineering
Office of the Dean

September 2, 2024

Provost James Dalton
The University of Alabama
Office for Academic Affairs
254 Rose Administration Building
Tuscaloosa, AL 35487

Dear Provost Dalton,

I am writing to recommend that you approve our proposal for the development of a master's degree in biomedical engineering (CIP Code: 14.0501) within the Department of Chemical and Biological Engineering. This new M.S. in Biomedical Engineering is a logical next step in the evolution of the integration of biological principles into engineering education and research here in the College of Engineering and at The University of Alabama, and the proposed degree is designed to prepare students for a variety of different potential future career pathways including as leaders in the field of biomedical engineering and also as leaders in related fields such as medicine. This degree program has been reviewed both in the department and the college, and there is unanimous support to go forward with the proposal.

The field of biomedical engineering has been significantly expanding over the last decade, and this is evidenced by many universities around the country expanding their degree offerings in this area. In fact, approximately 18 years ago, the Department of Chemical Engineering here at UA updated its name to Chemical and Biological Engineering to reflect the growing importance of biological principles within the field of chemical engineering. Since that time, the department has added a concentration in biological engineering within the undergraduate chemical engineering degree program, and many students (54 at present) are currently pursuing this concentration. Also, importantly over this same roughly two decade time period, a significant number of faculty members who specialize in areas related to biomedical engineering have also been hired into the department and are available to support such a program.

From the student perspective, there is tremendous interest in the biomedical engineering specialty (ranging from pre-med students to those involved in undergraduate research projects), and this is often mentioned by prospective students visiting campus, as well as current students in our undergraduate chemical engineering program. While we have already significantly expanded our graduate coursework offerings in this area, there is a need to formalize this as a master's degree program. This would help recognize and distinguish our student graduates who have completed this specialized academic training. Furthermore, it would create opportunities for undergraduate students with related science and engineering backgrounds to pursue an advanced degree in biomedical engineering, opening up additional career opportunities for them and attracting a more diverse population of students to the department at the same time. Strong support letters from premiere international companies working in this space (e.g., Evonik, Pfizer) confirm the need for students with this type of graduate-level academic training.

I believe that there are numerous academic and recruiting benefits to developing this graduate degree, and I therefore recommend the approval of this proposal without reservation.

Sincerely,

Clifford L. Henderson

Dr. Clifford L. Henderson,
Dean
College of Engineering
The University of Alabama

THE UNIVERSITY OF ALABAMA® | Graduate School

November 7, 2024

Provost James Dalton
The University of Alabama
Office for Academic Affairs
254 Rose Administration Building
Tuscaloosa, Alabama 35487

Dear Provost Dalton:

I join Dean Cliff Henderson in recommending the approval of the attached proposal for a new M.S. degree program in Biomedical Engineering offered through the College of Engineering. The proposed master's degree in Biomedical Engineering meets specific student and programmatic needs and will attract new graduate enrollments.

This degree program was recommended for approval by the Graduate Council of The University of Alabama at its meeting on November 6, 2024. We ask for timely handling of this item so that it may be considered at the February 2025 Board of Trustees Meeting.

If you approve of this proposal, please forward this request to President Bell at your earliest convenience.

Sincerely,

Susan Carvalho

Dr. Susan Carvalho
Associate Provost and Dean of the Graduate School

cc: Dr. André Denham, Associate Dean, Graduate School

EVONIK
Leading Beyond Chemistry

Evonik Corporation | 2 Turner Place | Piscataway, NJ 08854 | USA

June, 28 2024

Evonik Corporation
Birmingham Laboratories
750 Lakeshore Parkway
Birmingham, AL 35211
USA

To Whom It May Concern:

I am writing to express my strong support for the development of a Biomedical Engineering (M.S.) degree program within the Department of Chemical and Biological Engineering at the University of Alabama. As leader of the Research Development & Innovation team at Evonik Corporation Birmingham site, I believe that this program would provide students with a competitive advantage as they enter the bioproducts and pharmaceutical industry.

The bioproducts and pharmaceutical industry is constantly evolving, and there is a growing demand for professionals with a deep understanding of both engineering and biomedical sciences. Graduates with a Biomedical Engineering (M.S.) degree would have the necessary skills and knowledge to design and develop innovative products and technologies that can improve the quality of life for people around the world.

In conclusion, I urge you to seriously consider the development of a Biomedical Engineering (M.S.) degree program within the Department of Chemical and Biological Engineering at UA. Offering this degree program at UA would benefit not only the students, but also the industry as a whole. More students with this training would help to meet the growing demand for skilled professionals in the bioproducts and pharmaceutical industry, and would contribute to the development of new and innovative products that can save lives and improve health outcomes.

Thank you for your consideration.

Sincerely,

Katara Shaw
Sr. Director Research Development & Innovation | Health Care
Phone +1 205-917-2223
katara.shaw@evonik.com

May 15, 2024

To Whom It May Concern:

I would like to provide my strong support for the development of a **Biomedical Engineering (M.S.)** degree program within the Department of Chemical and Biological Engineering at UA. I have worked in the pharmaceutical industry for well over a decade, including the last several years with Pfizer. As a former hiring manager for Pfizer, I can say students obtaining Biomedical Engineering (M.S.) degrees have significant competitive advantages as they enter the pharmaceutical industry. More students with this training would benefit the industry, so I would strongly encourage you to offer this degree to your students at UA.

Sincerely,

Lucas Bruner
Project Lead-Engineering
Pfizer

University of Alabama System®

New Program Proposal Supplement

In addition to the items ACHE has requested for program proposals, please include the following additional items when developing and submitting academic program proposals to the System Office and the Board of Trustees for approval.

1. Institution:

☑ UA ☐ UAB ☐ UAH

Please select more than one institution for cooperative, joint, and shared degree programs.

2. Program Identification

Program Name: Biomedical Engineering
Degree Nomenclature: M.S.
Date of NPP Submission: 8/26/2024

3. Six-digit CIP Code: 14.0501

4. Executive Summary (not to exceed two pages)

The proposed Master of Science (MS) degree program in Biomedical Engineering aims to address the growing demand for skilled professionals in the rapidly advancing field of healthcare technology. By offering a comprehensive education in this interdisciplinary domain, we seek to equip students with the knowledge and skills necessary to meet critical industry needs.

The proposed MS program in Biomedical Engineering will feature an interdisciplinary curriculum designed to provide students with both a broad and in-depth understanding of the biomedical field. The program will familiarize students with emerging techniques, tools, and materials in biomedical engineering and prepare them for professional roles in the biomedical or biotechnology industries. Our curriculum will emphasize areas such as Biomaterials, Tissue Engineering, Drug Delivery, Polymers/Plastics, Nanotechnology, and Bioprocessing, aligning with our faculty's expertise and research areas.

Key Features:

1. **Interdisciplinary Curriculum:** The program will offer a diverse range of courses covering essential topics such as biochemical engineering, biomaterials, drug delivery, biomechanics, and tissue engineering. This interdisciplinary approach will enable students to gain a holistic understanding of biomedical engineering principles and their applications in real-world scenarios.

2. **Hands-on Experience:** Students will have opportunities to gain practical training and laboratory experience through research course credits. These experiences will expose students to state-of-the-art equipment and technologies used in biomedical research and development, allowing them to apply their knowledge to solve practical problems.

3. **Faculty Expertise:** The program will be led by a team of faculty members with expertise in various fields of biomaterials, including cell-material interactions, drug discovery, and delivery, pharmaceutical development and formulations, synthetic biology, cellular tissue models, stem cells, cancer biotechnology, and pain management. Their mentorship and guidance will enrich the learning experience and inspire students to pursue cutting-edge research and innovation.

The MS program in Biomedical Engineering is designed for recent graduates with a background in engineering, physics, biology, or related fields, as well as working professionals seeking to advance their careers in the biomedical industry. We aim to attract highly motivated individuals passionate about leveraging technology to improve healthcare delivery and patient outcomes. This program can also integrate well with our existing accelerated master's program.

In summary, the proposed MS degree program in Biomedical Engineering represents a significant opportunity to cultivate the next generation of biomedical innovators and leaders. By providing a diverse academic curriculum and hands-on training opportunities, graduates will emerge as highly sought-after professionals capable of driving transformative advancements in healthcare technology and biotechnology.

5. Steps taken to determine if other UA System institutions might be interested in collaborating in the program.

UAB is offering a similar program. The department has reached out to UAB about interest in possible collaboration, but there are no plans currently.

6. Summary of other campus comments, internal to the UA System or external (if any), regarding your plans for developing this program. Please include substantive feedback from the pre-proposal process.

Feedback: The program is described as follows: "*Our program will have a strong focus on Biomaterials: Tissue Engineering, Drug Delivery, Polymers/ Plastics, Nanotechnology, and Bioprocessing.*" There appears to be significant overlap with UAB's MS, which includes *biomedical implants and devices, multiscale computational modeling, tissue engineering, and regenerative medicine.* It would be helpful to address the program's unique foci further, which will allow differentiation.

Response:

1. One of the foci of UA's proposed Biomedical Engineering (M.S.) program is "Biomaterials". Biomaterials is a very broad topic involving all materials designed to interact with biological systems for a variety of applications. Our program at UA has been and will continue to emphasize *drug delivery systems, biomaterials models for disease mechanistic studies (such as cancer and neurological disorders), and nanosystem design for drug discovery*. In contrast, the BME MS program at UAB has a strong focus on subtopics like *biomedical implants and devices, multiscale computational modeling, tissue engineering for regeneration, and regenerative medicine*. Therefore, within the broad area of biomaterials, these two programs are complementary rather than competitive.
2. UA's proposed Biomedical Engineering (M.S.) program includes bioprocessing that utilizes living cells or their components to develop products, such as biopharmaceuticals and valuable chemicals. It encompasses bioreactor fermentation technology, cell culture, and downstream processing. This area is reflected by our existing courses (e.g., CHE 592- Microbial Engineering and CHE 516- Stem Cell Bioengineering) and a new proposed elective (CHE 5xx- Metabolic Engineering).
3. UA's proposed Biomedical Engineering (M.S.) program also embraces strong expertise in nanotechnology, including drug delivery systems, imaging techniques, and new diagnostic tools. For example, our program is highly active in the emerging and exciting research area of extracellular vesicles, including large-scale production, disease diagnosis, and therapy.
4. Although both programs include multiscale computational modeling, at UA we focus on protein-protein interactions, protein-ligand interactions, and ligand/protein-cell interactions. We emphasize applications that align with drug delivery systems, nanotechnology, and biomaterials modeling for disease mechanistic studies.

7. Describe the process that will be used by your institution for routine internal and/or external program review.

During the post-implementation period, the department will monitor enrollment, new enrollments, and the number of graduates each year. Additionally, the department will track the post-graduation outcomes of its graduates. Annually, the department will report on student learning outcomes as outlined in question 8.

At The University of Alabama, all departments undergo an academic program review (APR) approximately every eight years. This process includes a departmental self-study, an on-site visit by a review team comprising internal and external members, and the development of a strategic action plan by the department, informed by the review team's recommendations.

8. Describe the process that will be used in assessing program outcomes (to include student learning outcomes).

All Biomedical Engineering (M.S.) students will be evaluated with respect to student learning outcomes via specific assignments, including performance in major core courses and Capstone Experiences. The instructors in the core courses in conjunction with the Chemical and Biological Engineering (ChBE) Graduate Committee will perform the evaluation. A detailed assessment plan related to each student-learning outcome is attached as a separate

document.

9. Other pertinent information, if any.

University of Alabama System®

Board Rule 502
Notice of Pending Proposal (NPP) for a New Program of Instruction
(To be completed by the Provost's Office)

1. Institution:

☑ UA ☐ UAB ☐ UAH

Please select more than one institution for cooperative, joint, and shared degree programs.

2. Date of NPP Submission (mm/dd/yyyy):

3. Contact Information

Institutional Contact Person:	Carmen Coleman
Telephone:	(205) 348-3439
Email:	crjones18@ua.edu

4. Program Identification

Program Name:	Biomedical Engineering
Degree Nomenclature:	M.S.

5. 6-digit CIP Code: 14.0501

6. Program Mode of Delivery

Provide the planned delivery format(s) (i.e., in-person, online, hybrid) of the program along with the planned location(s) at which the program will be delivered (i.e., on-campus and/or at specific off-campus instructional site(s)). Please also note whether any program requirements can be completed through competency-based assessment.

- [x] In-person
- [ ] Online
- [ ] Hybrid
- [ ] On-campus
- [ ] Off-campus
- [ ] Competency-based
- [ ] Other, please describe:

7. Select a meeting for Board consideration:

- ○ April 11-12, 2024
- ○ June 6-7, 2024
- ○ September 12-13, 2024
- ○ November 7-8, 2024
- ◉ February 6-7, 2025
- ○ April 3-4, 2025
- ○ June 5-6, 2025
- ○ September 11-12, 2025
- ○ November 6-7, 2025
- ○ February 5-6, 2026
- ○ April 2-3, 2026
- ○ June 4-5, 2026

8. Is the proposed academic degree program currently listed on your campus Three-Year Academic Program Planning Report that is annually submitted to the Board of Trustees?

- (●) Yes
- ( ) No

If no, please explain.

9. Provide a brief description of the program.

The proposed master degree program in Biomedical Engineering will offer an interdisciplinary curriculum designed to train students with breadth and depth of knowledge related to the biomedical field, to familiarize students with emerging techniques, tools, and materials in the field of biomedical engineering, and to prepare students as professionals in biomedical or biotechnology industries. The Biolmedical Engineering (M.S.) program will have a strong focus on Biomaterials: Tissue Engineering, Drug Delivery, Polymers/ Plastics, Nanotechnology, and Bioprocessing, which are in line with the faculty expertise and research areas.

10. Relationship of program to other programs within the institution.

10.1. How will the program support or be supported by other programs within the institution?

The proposed program will provide additional opportunities to students who are in related programs, such as Chemical and Biological Engineering, Biology, Mechanical Engineering, Biochemistry, etc.

10.2. Will this program replace any existing program(s) or specialization(s), option(s) or concentration(s) within existing programs?

○ Yes

◉ No

If yes, please explain:

11. If this program is similar or duplicative of any other programs in the system or the state, please give your rationale for program duplication.

Another Biomedical Engineering M.S. program is offered at UAB.
The proposed program will complement, rather than compete with, the existing program by offering a different program focus. In particular, the proposed program will focus on the interests of current students and prospective students in biomedical engineering fields. Many of them are interested in opportunities to receive biomedical engineering training. The proposed Biomedical Engineering (M.S.) program will expand educational and career opportunities for students from a diverse disciplinary background.

12. Do you plan to explore possible program collaboration with other institutions? Please explain.

The immediate collaboration will be with Stillman College via the accelerated masters program, which allow students from Stillman College to attend the MS program as apart of the UA-Stillman Cooperative Exchange Program.

13. Please describe the need and/or level of student demand for this program.

I have collected student interest data from several aspects:
1. Based on surveys of students in our CHE 125 "Introduction to Chemical Engineering" course, approximately 60% of the entering freshmen are interested in pursuing a medical-related career (medical, dental, pharmaceuticals, etc.). This is based on a ~90% response rate. Our incoming class in Chemical Engineering is currently approximately 150 students. During on-site prospective student visits, many of the visiting students indicate their strong interest in a Biomedical Engineering degree option at UA.

2. We currently offer a Biological Engineering concentration within our chemical engineering (B.S.) degree program, which was launched in Fall 2021. Although it is a new concentration, we already have 54 students in the program.

3. In spring 2024, we surveyed our current chemical engineering students whether they would be interested in pursuing a Biomedical Engineering (M.S.) degree if it is offered. The responses were overwhelmingly positive with 53 of our current students indicating "Definitely YES" and 23 additional students indicating "Maybe YES". Additionally, during spring 2024, we conducted surveys of students' future career interests within the chemical engineering program. Among the 285 students surveyed, over 50% of the students plan to pursue a career in Biotechnology, Healthcare/Medicine, or Pharmaceuticals. Overall, our data supports a strong interest in a Biomedical Engineering (M.S.) degree program, as well as careers in this field.