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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Telephone: 334-844-6847

Program Information

Date of Proposal Submission: 3/13/2026
Award Level: Master's Degree
Award Nomenclature (e.g., BS, MBA): MS
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 Master's (MS) degree program in Biomedical Engineering at Auburn University is designed to prepare graduates to support the workforce development and continuing education needs of the biotechnology, pharmaceutical, and biomanufacturing industries in the State of Alabama. The proposed program will be available as either a course-based, non-thesis MS degree option (offered both on-campus or via distance education) or a thesis MS degree option. Each proposed degree program option will equivalently equip students with both a strong foundation in engineering fundamentals and graduate-level mastery of biomedical and health-related applications. Program curricula and thesis-option research focus areas include specialized topics such as biomaterials, drug delivery, cell and tissue biomanufacturing, medical imaging, diagnostics, medical devices, computational analysis, and biomechanics. The proposed MS program leverages existing engineering faculty expertise and research infrastructure, as well as ongoing coursework and interdisciplinary collaborations across multiple colleges, departments, and units at Auburn University.

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 education and training is already ongoing at Auburn University across the Samuel Ginn College of Engineering; the proposed Biomedical Engineering Master's degree program integrates currently offered coursework across all engineering departments into a concerted program. This program will provide a synergistic and cohesive educational track for master's-level students pursuing biomedical engineering careers, improving instructional efficiency and enhancing the overall quality of the student educational experience.
2. Graduates of the proposed Biomedical Engineering Master's degree program will develop advanced skills in applying engineering principles to address health and healthcare challenges, thereby meeting critical workforce needs in the State of Alabama and meaningfully contributing to an improved quality of life for constituents of Alabama, our nation, and beyond.
3. Sustained growth in Alabama's biotechnology, pharmaceutical, and biomanufacturing sectors depends on the recruitment and retention of a workforce with graduate-level training in biomedical engineering. Currently, Auburn graduates who wish to pursue graduate education in Biomedical Engineering typically leave the state to do so, and often do not return. The proposed Biomedical Engineering Master's program will help retain Auburn-trained engineers and support the in-state talent-pipeline for biomedical-related industry sectors.

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 comprehension of biomedical engineering fundamentals and specialized knowledge in an area of concentration or field of research, such as Biomaterials and Drug Delivery, Cell and Tissue Biomanufacturing, Medical Imaging and Diagnostics, Computational Biomedical Engineering, or Biomechanics and Devices.
2. Effectively communicate complex, engineering and healthcare-related concepts effectively via technical writing and oral presentation.
3. Provide sound justification for course project and/or research plans based on the technical literature and science and engineering fundamentals.
4. Integrate advanced engineering principles with biological and medical sciences to solve complex biomedical problems.

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 MS program focuses on a wide range 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 classic engineering fundamentals to medical and health-related questions. Distinctively, coursework and training are more application- and industry-focused and less clinical research-focused. The proposed MS program is being requested to integrate this ongoing

			training into one concerted program, making it accessible to Auburn students.
14.0501	Biomedical Engineering	University of Alabama	The UA Biomedical Engineering MS program is offered in-person and focuses on biomaterials, cell engineering, and biopharmaceutical processes. The proposed biomedical engineering MS program at Auburn University is offered both in-person and online and integrates ongoing coursework and research training currently distributed across the entire College of Engineering (Aerospace Engineering, Chemical Engineering, Computer Science, Electrical Engineering, Industrial and Systems Engineering, Materials Engineering, and Mechanical Engineering programs). As such, the proposed program curriculum will inherently cover a broader range of biomedical and health-related engineering topics and prepare students to contribute to different employer workforce needs.

The proposed Biomedical Engineering graduate degree programs at Auburn University build upon and incorporate 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 narrowly focused or more clinically oriented biomedical engineering programs, such as those outlined above. The proposed MS 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 MS 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.

The proposed program will enable students 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.

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 is completed and MS elective course selection.

Current BS students and Engineering Online students are already being recruited into ongoing MS 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 coursework. This is expected to continue and increase with the availability of a biomedical engineering MS 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 programs are 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 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 and plans are being developed for 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 Physics 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 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 MS program curriculum and the content of the required core courses. Industry input has been sought from Alabama employers through multiple avenues, including in person round table mediated 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 MS 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:

Choose an item.

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.

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 can complete the entire Biomedical Engineering Non-thesis MS program through distance education. Delivery of hyflex courses (jointly in-person and online) will be facilitated by Auburn Engineering Online. Auburn Engineering Online has been facilitating Distance Education for engineering students working in industry for over forty years (since 1984).

For the Biomedical Engineering Thesis MS program, the mandatory research credit hours will need to be completed in-person.

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. There could be long-term career advancement advantages to having a PhD for specific roles.

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 MS new student enrollment numbers are estimated to be twenty in year four, reaching a steady state by year six of twenty-seven new students yearly. The full student enrollment numbers are reported in the Business Plan, Lines 24-27; these numbers were determined based on a conservative estimate of the numbers of students expected to enroll in the MS program as part of the potential Accelerated Bachelor's to Master's pathway, non-thesis MS program, and thesis MS program. The information used in this projection was collected through an EAB study, an employer survey, and a survey of current Auburn University students.

Auburn Engineering Online students are typically working in industry while taking classes; therefore, these numbers were based on the EAB study, employer survey results, and the typical yearly number of current Engineering Online students working in the pharmaceutical industry. For online Biomedical Engineering MS students, the yearly new enrollment headcount is projected to reach five by year four and reach a steady state in year six of seven students.

To estimate student enrollment in on-campus non-thesis and thesis MS programs, Auburn University students pursuing STEM degrees were surveyed about their interest in completing a Biomedical Engineering MS degree; over 42% of respondents (196 out of 466) indicated that they were interested, representing almost 25% of the survey recipients. Among engineering students responding, approximately 25 students from each of the surveyed years (freshmen, sophomore and junior) indicated an interest in pursuing an MS degree; the numbers were highest among freshman and juniors.

Based on this combined information, student enrollment is estimated to reach twenty by year four and a steady state of twenty-five students in year six. It is estimated that fifteen of these twenty-five students could potentially matriculate through a future Accelerated Bachelor's to Master's pathway; for these fifteen students, only the two semesters (twenty-one credit hours) of coursework after finalizing the Bachelor's degree were included in the projected revenue.

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:

New Program Proposal

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

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

New Program Proposal

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.

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

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)**
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

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)**
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 MS program was calculated per credit hour for the online MS program students (twenty percent of projected enrollment) and per term for the remaining MS program students.

For the MS program students anticipated to potentially enroll through an Accelerated Bachelor's to Master's option (sixty percent of protected enrollment), only the semesters after finalizing the Bachelor's degree were included in the projected revenue. To be conservative, 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.

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ACADEMIC DEGREE PROGRAM BUSINESS PLAN								
INSTITUTION:	**Auburn University**							
PROGRAM NAME:	**Biomedical Engineering Master's Degree**						**CIP CODE:**	
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**
PERSONNEL SALARIES & BENEFITS	$196,600	$179,133	$187,744	$165,994	$154,535	$152,728	$151,558	$1,188,292
EQUIPMENT	$0	$0	$0	$0	$0	$0	$0	$0
FACILITIES	$0	$0	$0	$0	$0	$0	$0	$0
ASSISTANTSHIPS/FELLOWSHIPS	$0	$0	$0	$92,489	$83,596	$80,213	$77,280	$333,578
LIBRARY	$0	$0	$0	$0	$0	$0	$0	$0
ACCREDITATION	$0	$0	$0	$0	$0	$0	$0	$0
OTHER COSTS	$77,108	$88,307	$92,552	$240,005	$76,180	$75,290	$74,714	$724,156
TOTAL EXPENSES	$196,600	$179,133	$187,744	$258,484	$238,131	$232,941	$228,838	**$2,246,026**
***NEW* REVENUES AVAILABLE FOR PROGRAM SUPPORT**								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**TOTAL**
TUITION + FEES	$116,295	$255,504	$414,646	$452,139	$461,432	$499,475	$537,804	$2,737,295
EXTERNAL FUNDING	-	-	-	-	-	-	-	$0
REALLOCATIONS	$144,085	$131,284	$137,595	$0	$0	$0	$0	$412,964
TOTAL REVENUES	$260,380	$386,788	$552,241	$452,139	$461,432	$499,475	$537,804	**$3,150,259**
ENROLLMENT PROJECTIONS								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**AVERAGE**
FULL-TIME ENROLLMENT HEADCOUNT	**No data reporting**	17	25	25	25	25	25	**23.67**
PART-TIME ENROLLMENT HEADCOUNT		4	8	10	10	12	14	**9.67**
TOTAL ENROLLMENT HEADCOUNT		21	33	35	35	37	39	**33.33**
***NEW* ENROLLMENT HEADCOUNT**		20	28	30	30	32	32	**28.67**
Validation of Enrollment			**YES**	**YES**	**NO**	**NO**	**NO**	
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**	10	21	33	35	35	37	**28.50**

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**	9
Credit hours in **Program Options (concentrations/specializations/tracks)**	15
Credit hours in **Program Electives**	6
Credit hours in **Required Thesis/Research**	N/A
Credit hours in **Required Capstone/Internship/Practicum**	N/A
Total Credit Hours Required for Completion:	**30**

Maximum number of credits that can be transferred in from another institution and applied to the program:	6
Intended program duration in semesters for full-time students:	5
Intended program duration in semesters for part-time students:	10

	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): Students will select between a Thesis or Non-Thesis option (12 ch). As part of the core curriculum in either the Thesis or Non-Thesis Option, students will also select one course from an approved foundational graduate engineering curriculum that is aligned with the student's BS engineering expertise (3 ch).

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 (MASTER'S)			
Curriculum Components of Proposed Program				
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
Program Courses		**9**		
BMEN 6810	Fundamentals of Biomedical Engineering	3		
BMEN 6850	Quantitative Physiology	3		
BMEN 6870	Quantitative and Mathematical Methods in BME	3	Y	
Program Options (enter total credit hours from all options below)		**15**		
Program Electives		**6**		
BMEN 6830	Cell and Tissue Engineering	3		
BMEN 6840	Computational Biomedical Engineering Fundamentals	3	Y	
BMEN 6860	Biomedical Engineering Project Management, Bioethics, and Research Skills	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		**N/A**		

Capstone/Internship/Practicum		**N/A**		
	Total Credit Hours Required for Completion:	**30**		

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:	**Thesis Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
BMEN 6860	Biomedical Engineering Project Management, Bioethics, and Research Skills	3	Y	
BMEN 7950	Graduate Seminar	1		
BMEN 7990	Research and Thesis	varies		
	Total Option Credit Hours Required for Completion:	12		

Option Name:	**Non-Thesis Option**			
Course Number	**Course Name**	**Credit Hours**	**New? (Y)**	**WBL? (Y)**
Varies	Select an additional 12 credit hours from Program Electives, including optionally BMEN 6860	3		
	Total Option Credit Hours Required for Completion:	12		

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) M.S. Curriculum

The Biomedical Engineering Master of Science degree may be earned under a thesis or non-thesis option, both of which may be completed entirely online.

MS Thesis Option

The required coursework includes 30 credit hours, comprised of 21 graded credit hours and 9 ungraded, research and thesis, independent study, and graduate seminar credit hours. One semester of graduate teaching assistantship to solidify core knowledge is also required.

The thesis defense consists of a written thesis followed by an oral examination administered by the research advisory committee. The research advisory committee is comprised of at least three faculty members, including at least two engineering faculty members, one of whom is the chair or co-chair of the committee. Successful completion requires unanimous approval of the research advisory committee.

Required Graded Coursework for BMEN MS Thesis (21 hours)

BMEN MS Thesis 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 Biomedical Engineering (3 hours)
One course selected from approved foundational graduate engineering curriculum aligned with the student's BS engineering expertise (3 hours)*

Engineering Technical Electives (6 hours):

Two 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 MS Thesis (9 hours)

BMEN 7990 Research and Thesis (6 hours)
BMEN 7950 Graduate Seminar (up to 3 hours)
BMEN 7900 Independent Study (up to 3 hours)

*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 MS THESIS PLAN OF STUDY GRID

First Year			
Fall	**10**	**Spring**	**11**
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 7990 Research and Thesis	1	BMEN 7990 Research and Thesis	1
		BMEN 7950 Graduate Seminar	1

First Year Summer Semester	
Summer	**2**
BMEN 7990 Research and Thesis	1
BMEN 7900 Independent Study	1

Second Year			
Fall	**5**	**Spring**	**3**
BMEN Technical Elective 2	3	BMEN 7990 Research and Thesis	2
BMEN 7990 Research and Thesis	1	BMEN 7950 Graduate Seminar	1
UNIV 4AA0 Graduation	0		

KEY: BMEN M.S. Thesis Core Courses, Technical Electives, Ungraded Courses

MS Non-thesis Option

The required coursework includes 30 graded credit hours.

Required Graded Coursework for BMEN MS Non-thesis (30 hours)

BMEN MS Non-thesis Core (9 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)

One course selected from approved foundational graduate engineering curriculum aligned with the student's BS engineering expertise (3 hours)*

Engineering Technical Electives (21 hours):

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

*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 MS NON-THESIS PLAN OF STUDY GRID

First Year			
Fall	**9**	**Spring**	**9**
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 Technical Elective 2	3
BMEN Technical Elective 1	3	BMEN Technical Elective 3	3

First Year Summer Semester	
Summer	**6**
BMEN Technical Elective 4	3
BMEN Technical Elective 5	3
UNIV 4AA0 Graduation	0

Second Year			
Fall	**6**		
BMEN Technical Elective 6	3		
BMEN Technical Elective 7	3		

KEY: BMEN M.S. Non-Thesis Core Courses, Technical Electives, Ungraded Courses

EAB

Feasibility of an Online Master's in Biomedical Engineering

Program Feasibility Study Completed for
Auburn University
July 2022

Market Insights Brief

Credential Design and Curriculum Analysis
- Knowledge and Skills Heatmap
- Profiled Program Review

Market Pulsecheck
- Labor Market Intelligence
- Competitive Intelligence

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Table of Contents

Recommendations and Considerations

Research Challenge

The partner institution requested a program feasibility study to:

- Validate market demand for new program
- Identify top employers and in-demand job knowledge and skills
- Evaluate peer programs
- Provide curricular guidance

A full list of research questions appears in appendix B.

Recommended Next Steps

- *Request a market opportunity scan* for help identifying more promising new program subjects
- *Develop outcomes-focused recruitment messages* when beginning program recruitment

Offer Flexible Online Coursework, Confer Software Engineering Skills, and Incorporate Experiential Learning Opportunities to Launch Competitive Program

Executive Overview

Growing employer demand, strong occupational growth, and growing student demand suggest new program potential, but strong competition may pose a challenge for new programs entering the market. Local and regional employers indicated a low need for program graduates. Employers posted a low number of job postings in the past 12 months. Relevant employer demand outpaced employer demand growth for master's-level professionals overall locally but grew slower than average regionally. In contrast to the limited historic demand, employment in four of the top five relevant occupations is projected to increase faster than average over the next decade in both regions.

Between the 2015-16 and 2019-20 academic years, relevant degree completions increased each year on average while the number of competitors remained relatively consistent. The growth in student demand outpaced the growth in competition, suggesting an opportunity for new programs to enter the market. However, Georgia Institute of Technology emerged as strong competition in both the regional and local landscapes. In the 2019-20 academic year, the institution held 61.73% of the local market share. Further, the top five regional institutions held 61.17% of the total market share. The presence of strong market leaders suggests smaller or new programs may struggle to establish themselves in the competitive market.

Offer flexible coursework and multiple degree pathways (e.g., dual degrees) to attract more students. Two profiled programs offer their program online, and three programs offer multiple or unique degree pathways for students to complete the program. Programs with flexible options (e.g., online delivery, evening courses) appeal to millennial students concerned with balancing family and work-related commitments and further education.

Offer courses conferring software engineering skills to better prepare students for job opportunities. No profiled programs offered courses conferring software engineering and programming skills. However, between April 2019 and March 2022, programming and software engineering skills were increasingly requested by regional employers. Offering a course conferring software engineering and development skills would help Auburn University stand out amongst competitors and prepare students for a wider range of professional opportunities post-graduation.

Incorporate experiential learning opportunities to align with competitors and show program rigor. Four of five programs offer experiential learning for students. Three programs offer the opportunity for students to complete a thesis, but only one requires it. Notably, North Carolina State University offers experiential coursework in their curriculum to expand unique and hands-on learning opportunities for students.

I. Market Pulsecheck

An evaluation of employer demand for graduates from the proposed master's-level biomedical engineering program in both local and regional markets, and student demand for similar programs.

Analysis Includes:

- Job Posting Trends
- Top Titles
- Top Skills
- Top Employers
- Top Industries
- Top Cities
- Experience Levels
- Education Levels
- Degree Completion Trends

The analysis considered demand:

- Within a 200-mile radius of Auburn University
- Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, Tennessee

Growing Student Demand and Strong Projected Occupational Growth Suggest Program Potential, But Strong Competition May Pose a Barrier

Preliminary Program Outlook

Despite limited historical employer demand, strong projected occupational growth indicates growing job opportunities in the coming years. Local and regional employers indicated a low need for program graduates. Employers posted a low number of job postings in the past 12 months (i.e., 357 locally and 1,149 regionally). Relevant employer demand outpaced employer demand growth for master's-level professionals overall locally (i.e., 2.50% vs 1.32%), but grew slower than average regionally (i.e., 1.60% vs. 1.75%). Administrators should note, the average monthly demand growth equates to only one job posting per month locally and three per month regionally. In contrast to the limited historic demand, employment in four of the top five relevant occupations is projected to increase faster than average over the next decade in both regions. This suggests moderate employment opportunities for program graduates.

Growth in student demand outpaced growth in competition in both regions, suggesting a favorable competitive landscape for new programs. Between the 2015-16 an 2019-20 academic years, relevant degree completions increased each year on average (i.e., 14.84% locally and 7.06% regionally). In this same period, the number of institutions reporting completions remained relatively consistent (i.e., a net increase of one institution locally and two institutions regionally). The growth in student demand outpaced the growth in competition, indicating an opportunity for new programs to enter the market.

However, the presence of strong market leaders in both regions may pose a challenge for new program launch. Administrators should note the strong presence of Georgia Institute of Technology in both competitive landscapes. In the 2019-20 academic year, the institution held 61.73% of the local market share and 17.18% of the regional market share. Further, the top five regional institutions held 61.17% of the total market share. The presence of strong market leaders suggests smaller or new programs may struggle to establish themselves in the competitive market. Administrators should expect strong competition from Georgia Institute of Technology and other top regional competitors.

Administrators should also note, no programs either analyzed region reported completions with a 100% distance delivery option in the 2019-20 academic year.

Research Limitations

Because institutions self-report data to the NCES, some comparable and competitor programs may have chosen to report completions for master's-level biomedical engineering programs under an alternate CIP code and may not be included in the analysis.

Local Analysis of Job Postings for Master's-Level Biomedical Engineering Professionals

Local employer demand trends indicate a low need for program graduates. Employers posted a low number of relevant job postings in the last 12 months (i.e., 357 job postings). Relevant employer demand outpaced employer demand growth for master's-level professionals overall (i.e., 2.50% vs. 1.32%). However, the growth may appear inflated due to a small volume of job postings, as the average monthly demand growth equates to one posting per month. Taken together, these trends indicate graduates may face a labor market with few relevant openings.

+2.50%

Average Monthly Demand Growth

April 2019 - March 2022, Local Data

- Average monthly growth of one postings.
- During the same period, demand for all master's-level professionals grew 1.32%.

62 job postings

Average Monthly Demand

April 2019 - March 2022, Local Data

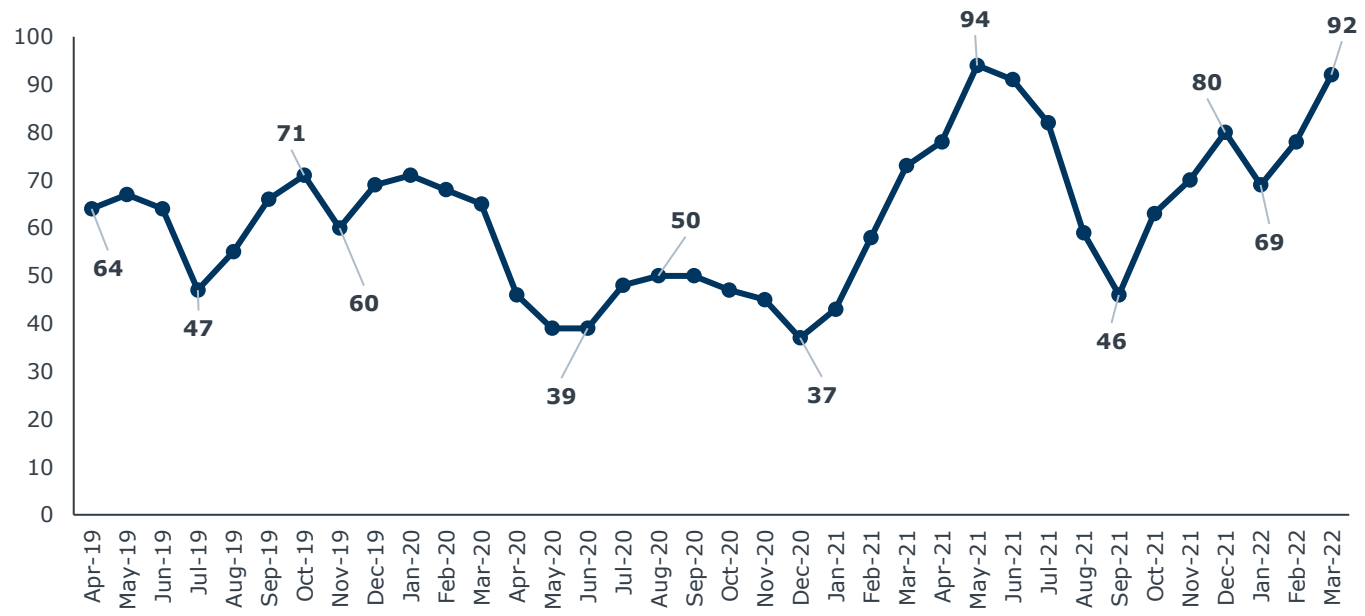
357 job postings

Relevant Jobs Posted in the Past Year

April 2021 - March 2022, Local Data

Job Postings for Master's-Level Biomedical Engineering Professionals over Time

April 2019 - March 2022, Local Data



Source: EAB analysis. Emsi Analyst.

Regional Analysis of Job Postings for Master's-Level Biomedical Engineering Professionals

Regional employer demand trends indicate low need for program graduates. Employers posted a low number of relevant job postings in the last 12 months (i.e., 1,149). Relevant employer demand growth paced slightly behind the average monthly employer demand growth for master's-level professionals overall (i.e., 1.60% vs. 1.75%). Further, between April 2019 and March 2022, the market grew an average of only three job postings each month. Taken together, program graduates will likely enter a slow growing labor market.

+1.60%

Average Monthly Demand Growth

April 2019 - March 2022, Regional Data

- Average monthly growth of three postings.
- During the same period, demand for all master's-level professionals grew 1.75%.

219 job postings

Average Monthly Demand

April 2019 - March 2022, Regional Data

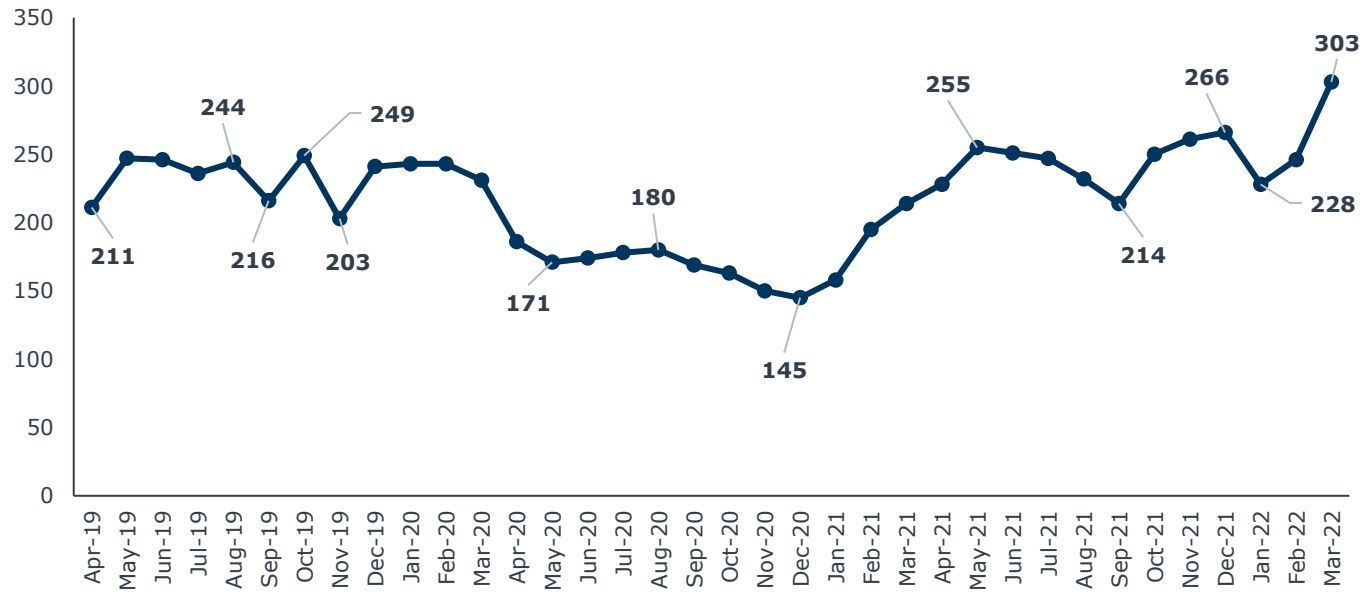
1,149 job postings

Relevant Jobs Posted in the Past Year

April 2021 - March 2022, Regional Data

Job Postings for Master's-Level Biomedical Engineering Professionals over Time

April 2019 - March 2022, Regional Data



Source: EAB analysis. Emsi Analyst.

Analysis of Employment for Biomedical Engineering Professionals

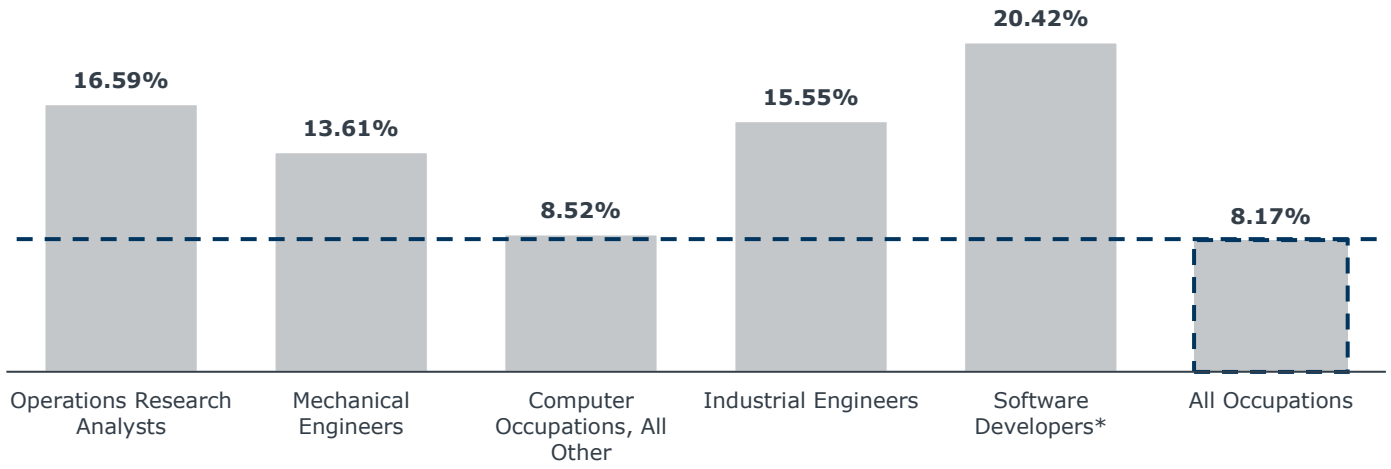
Employment is projected to increase faster than average in each of the five top occupations in both the local and regional markets. This indicates employment opportunities for graduates will likely increase across 2022 to 2032.

Administrators should note the "Software Developers*" occupation includes job titles such as "Design Quality Engineers" and "Application Engineers."

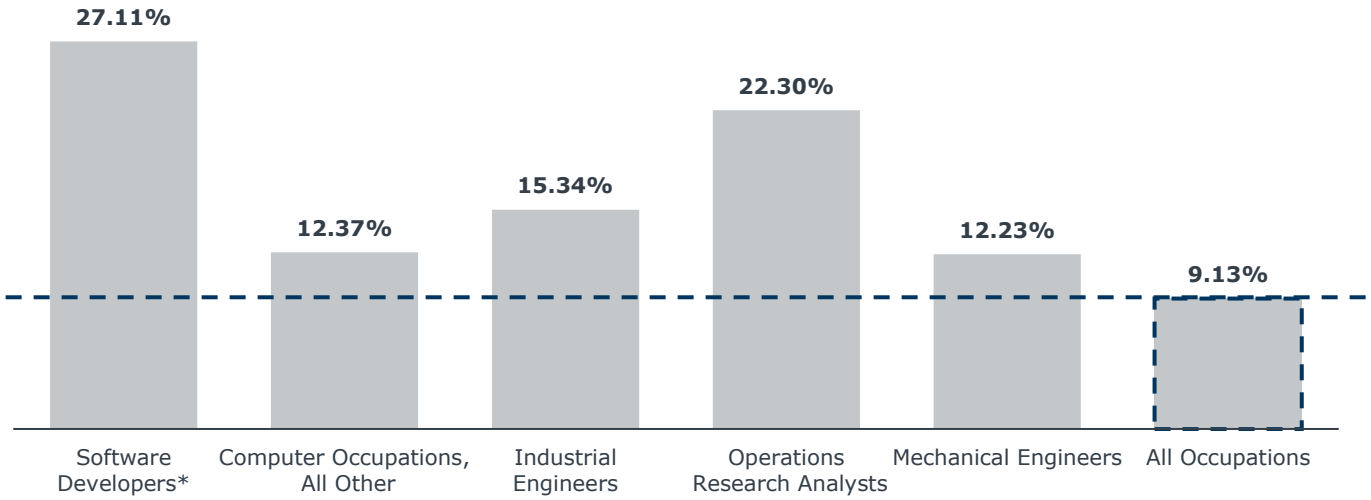
While these occupations represent the most common occupations appearing in job postings for master's-level biomedical engineering professionals, the projected employment data considers all jobs within an occupation at all degree levels.

Projected Employment in Top Occupations[1]

2022-2032, Local Data



2022-2032, Regional Data



*Software Developers, Quality Assurance Analysts, and Testers

The dashed blue line represents the projected employment growth across all occupations from 2022 to 2032.

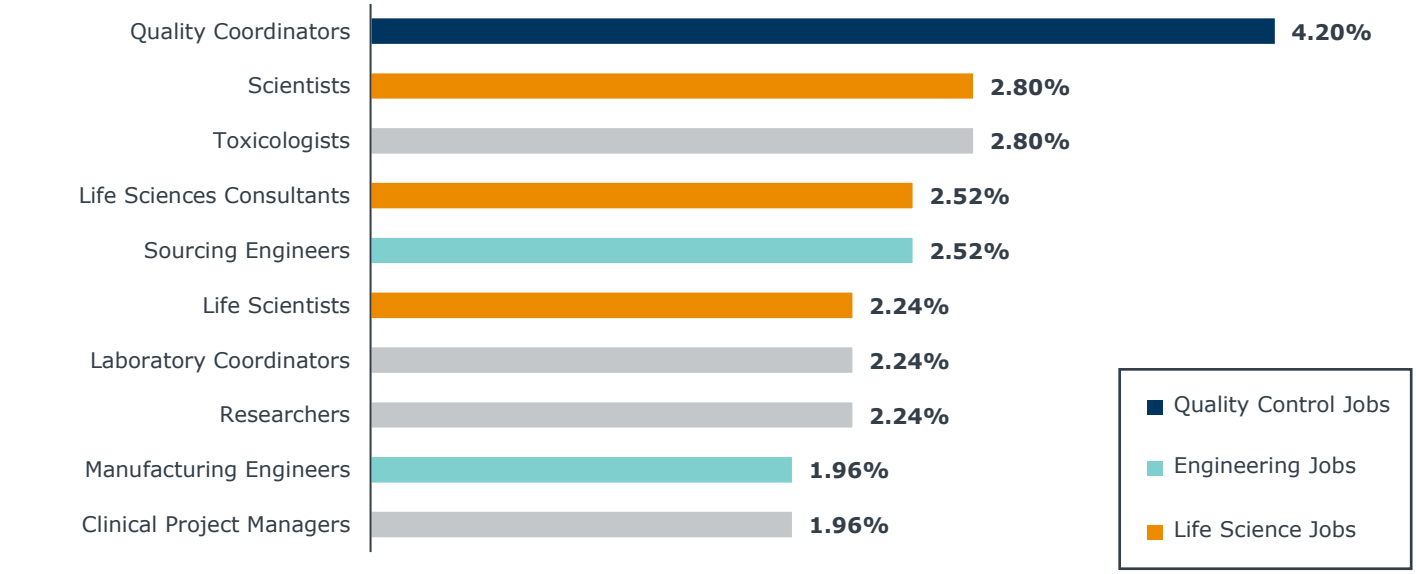
1) Top occupations refer to the occupations in which employers most often seek relevant professionals.

Source: EAB analysis. Emsi Analyst.

Top Titles in Job Postings for Master's-Level Biomedical Engineering Professionals

April 2021 - March 2022, Local Data

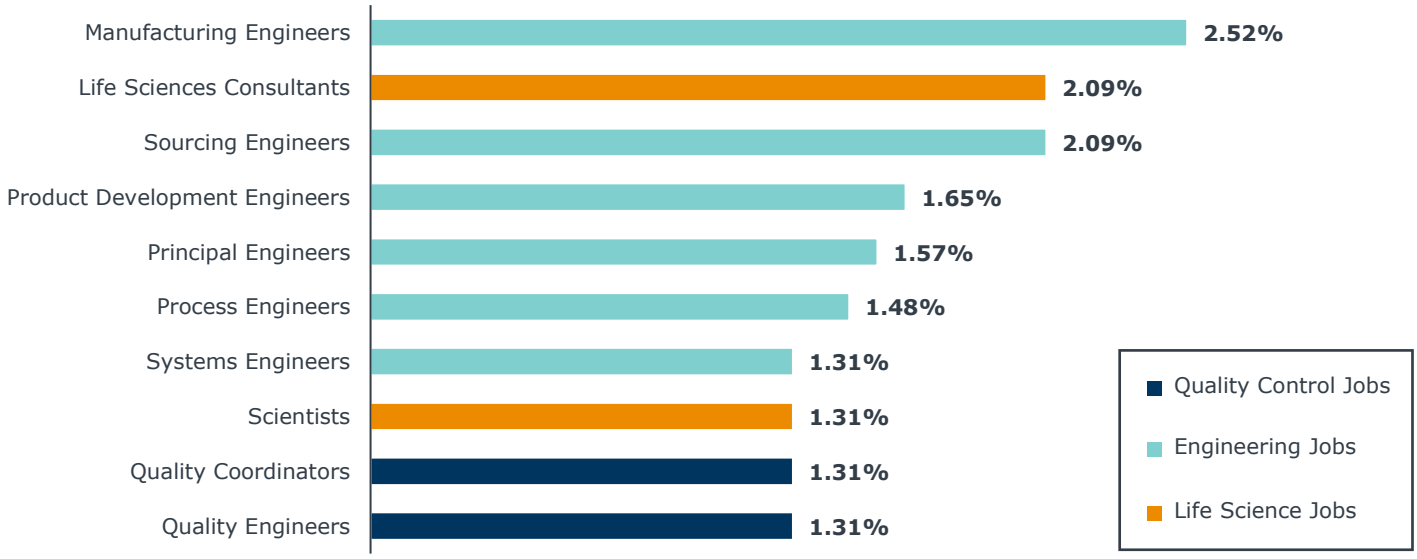
n = 357 job postings



Top Titles in Job Postings for Master's-Level Biomedical Engineering Professionals

April 2021 - March 2022, Regional Data

n = 1,149 job postings

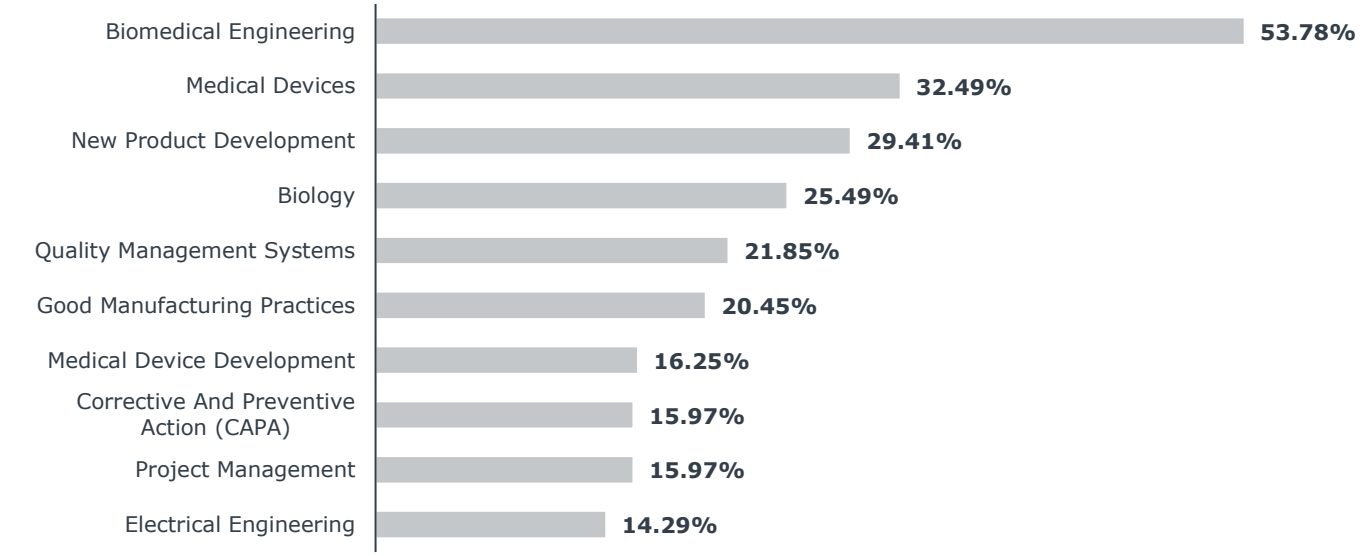


Source: EAB analysis. Emsi Analyst.

Top Skills Requested of Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Local Data

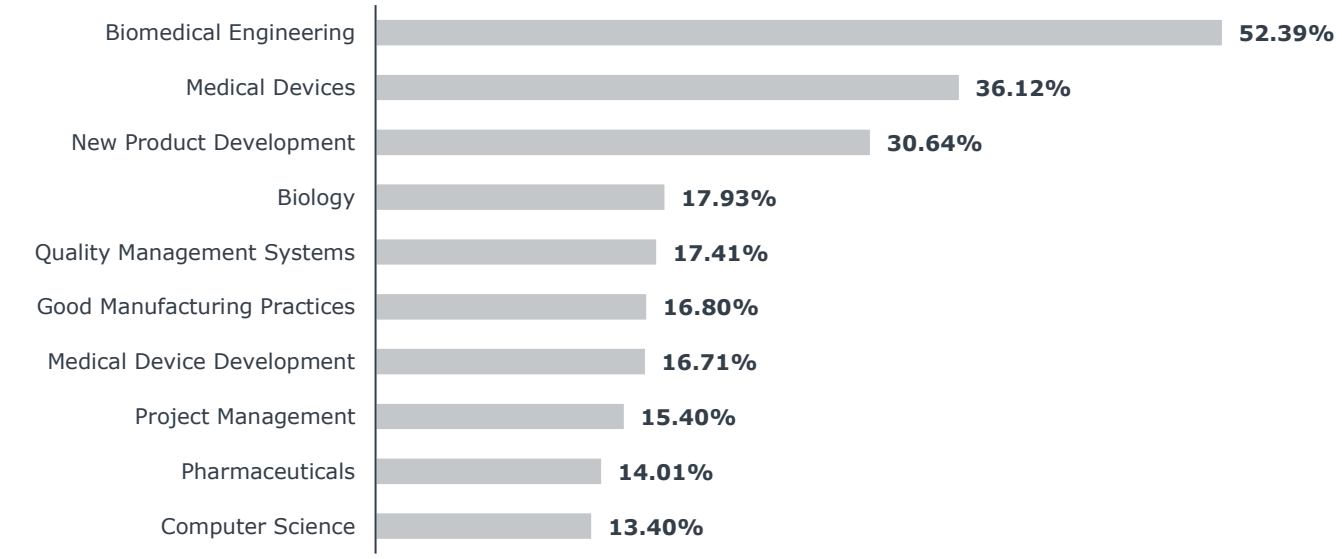
n = 357 job postings



Top Skills Requested of Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Regional Data

n = 1,149 job postings

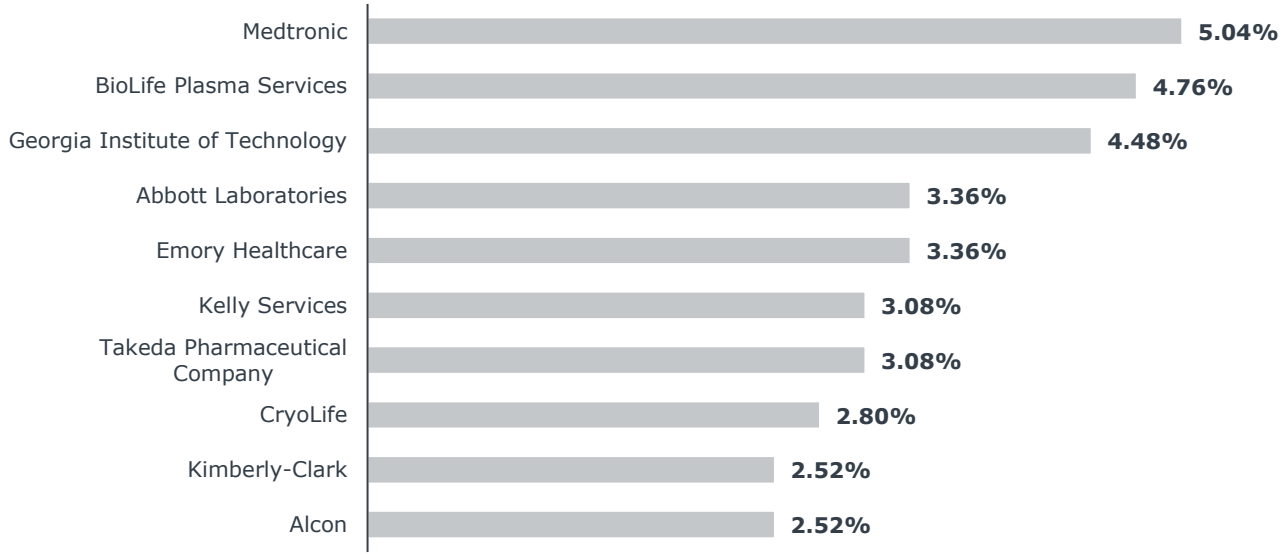


Source: EAB analysis. Emsi Analyst.

Top Employers Seeking Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Local Data

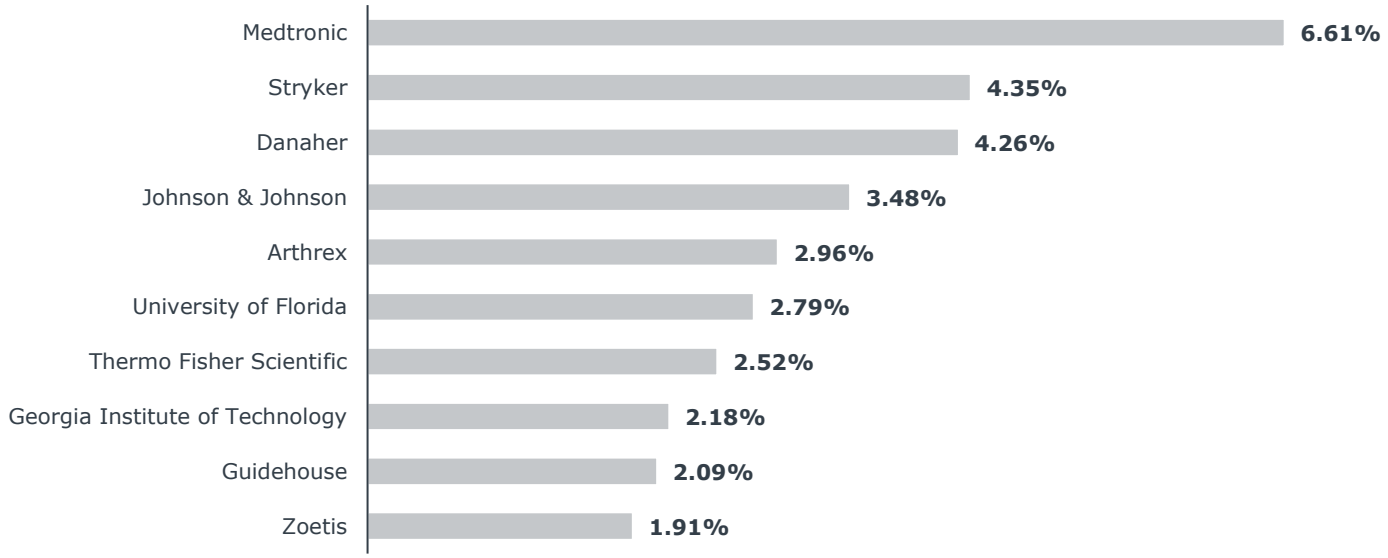
n = 357 job postings



Top Employers Seeking Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Regional Data

n = 1,149 job postings

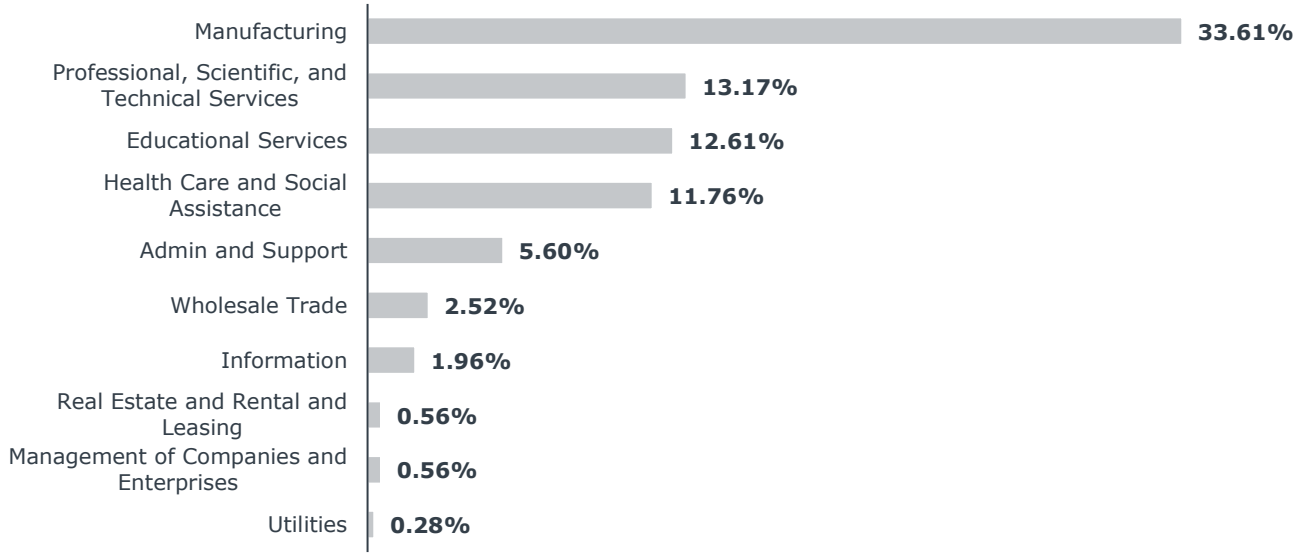


Source: EAB analysis. Emsi Analyst.

Top Industries Advertising Master's-Level Biomedical Engineering Job Postings

April 2021 - March 2022, Local Data

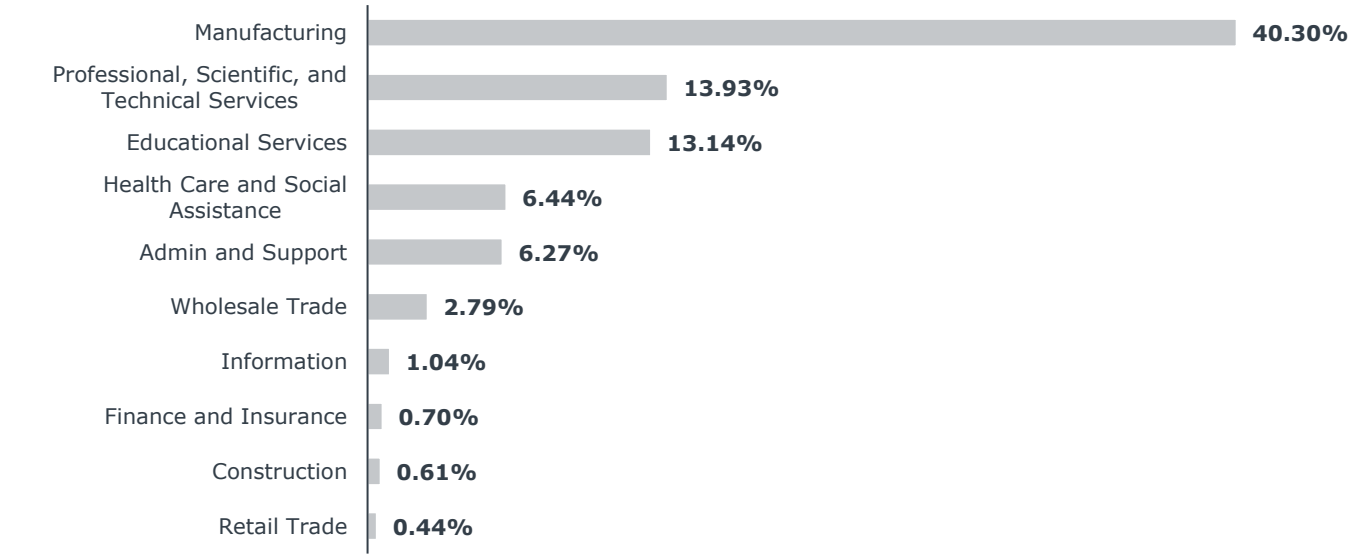
n = 357 job postings



Top Industries Advertising Master's-Level Biomedical Engineering Job Postings

April 2021 - March 2022, Regional Data

n = 1,149 job postings



Emsi Analyst often classifies job postings from staffing companies under the category "Administrative and Support and Waste Management and Remediation Services."

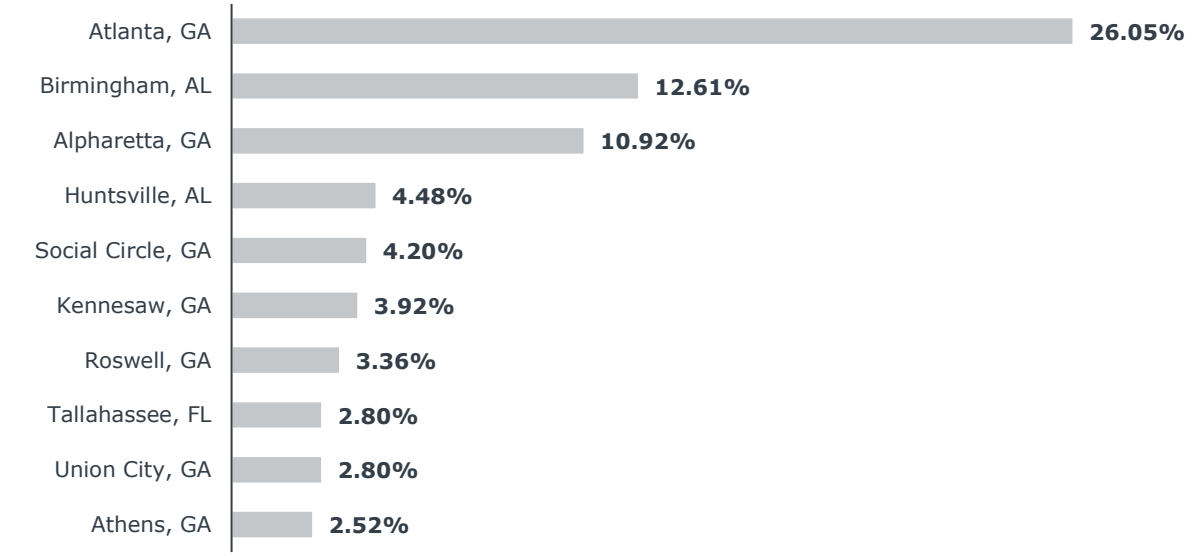
Label abbreviations:
- "Admin and Support" - Administrative and Support and Waste Management and Remediation Services

Source: EAB analysis. Emsi Analyst.

Top Cities Seeking Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Local Data

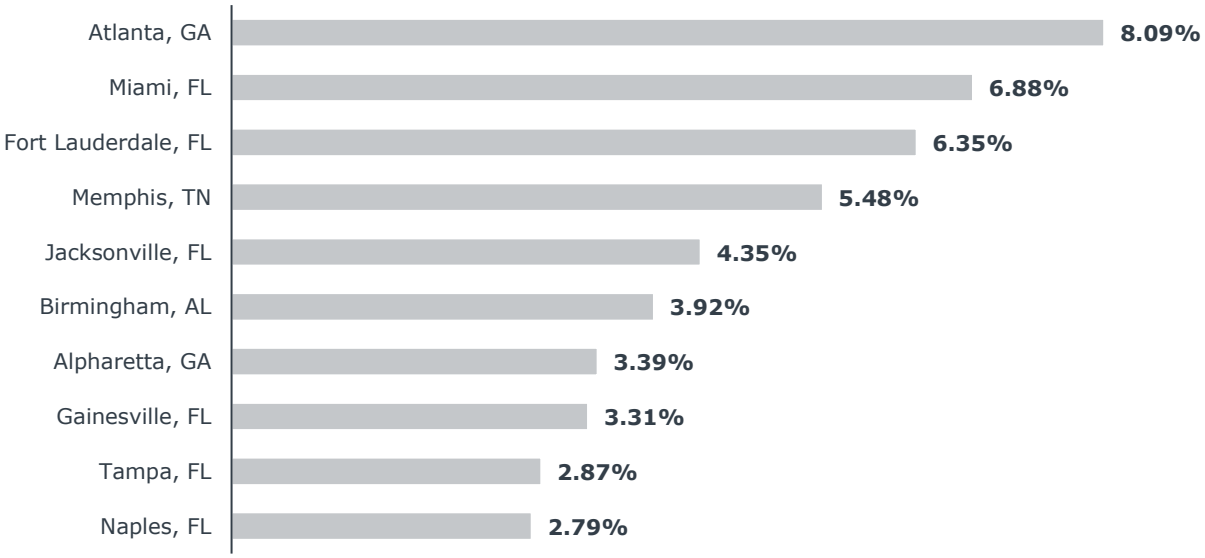
n = 357 job postings



Top Cities Seeking Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Regional Data

n = 1,149 job postings



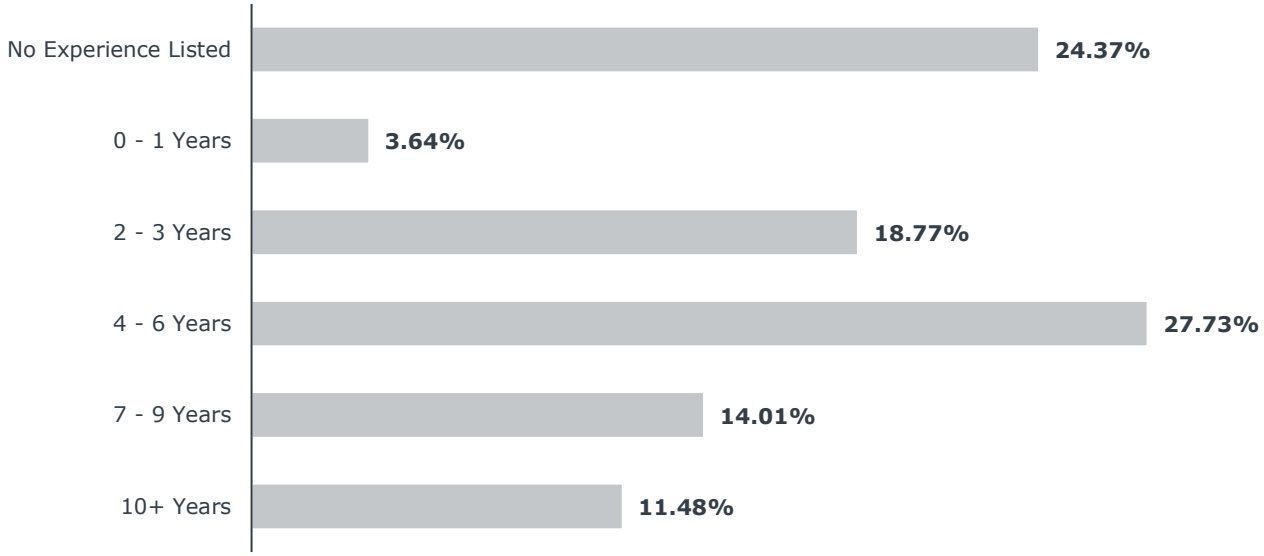
Emsi Analyst often classifies job postings from staffing companies under the category "Administrative and Support and Waste Management and Remediation Services."

Source: EAB analysis. Emsi Analyst.

Experience Levels Requested of Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Local Data

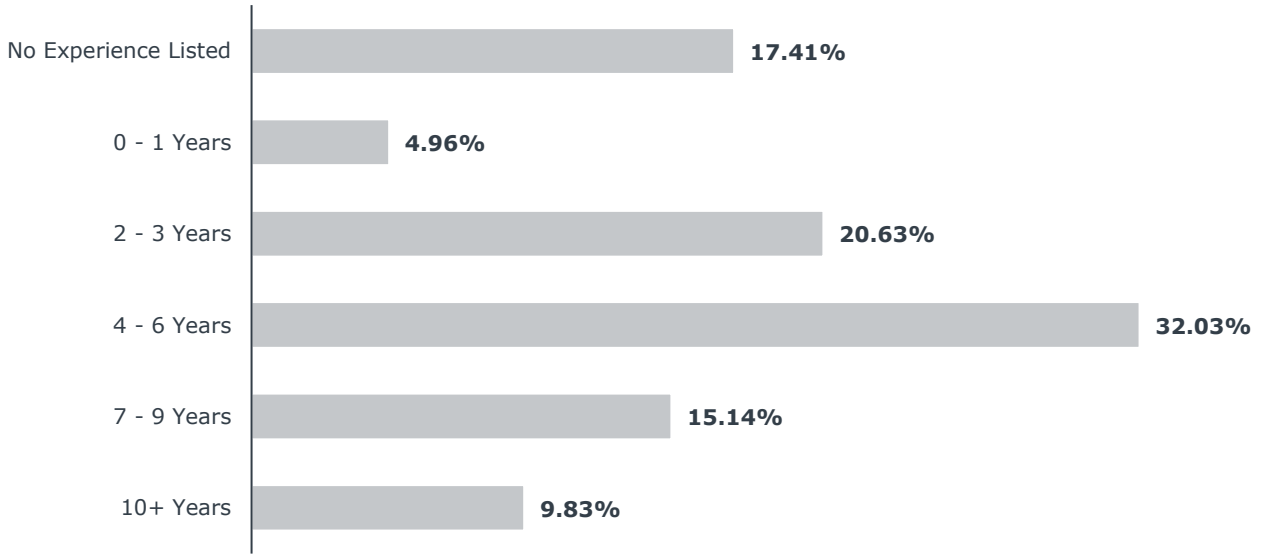
n = 357 job postings



Experience Levels Requested of Master's-Level Biomedical Engineering Applicants

April 2021 - March 2022, Regional Data

n = 1,149 job postings

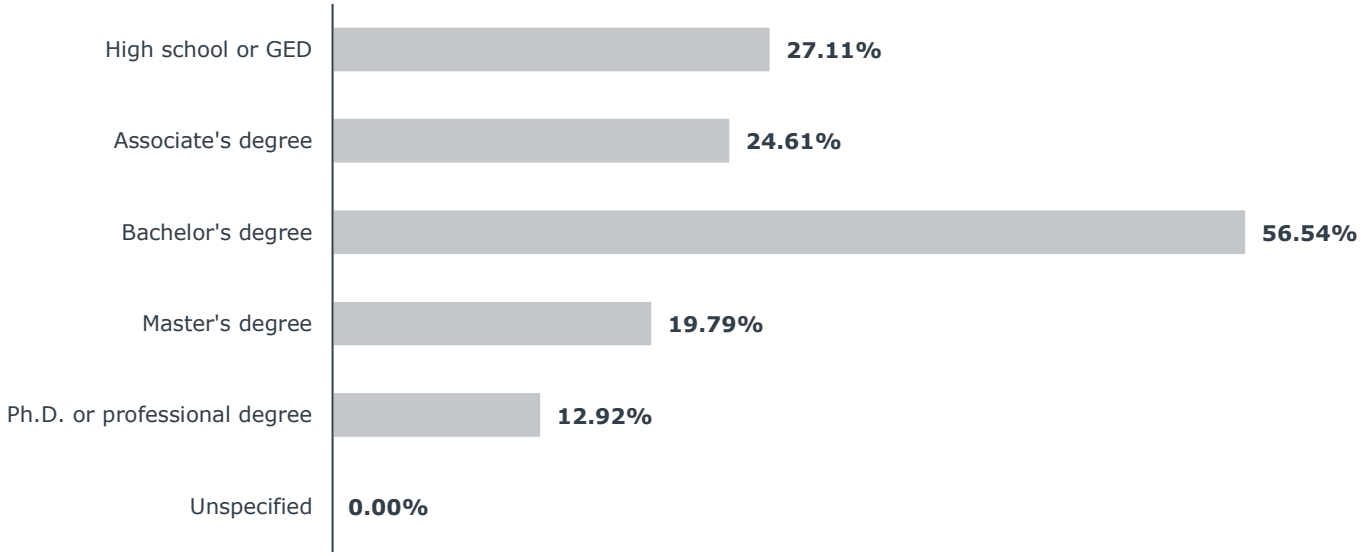


Source: EAB analysis. Emsi Analyst.

Education Levels Requested of Biomedical Engineering Applicants

April 2021 - March 2022, Local Data

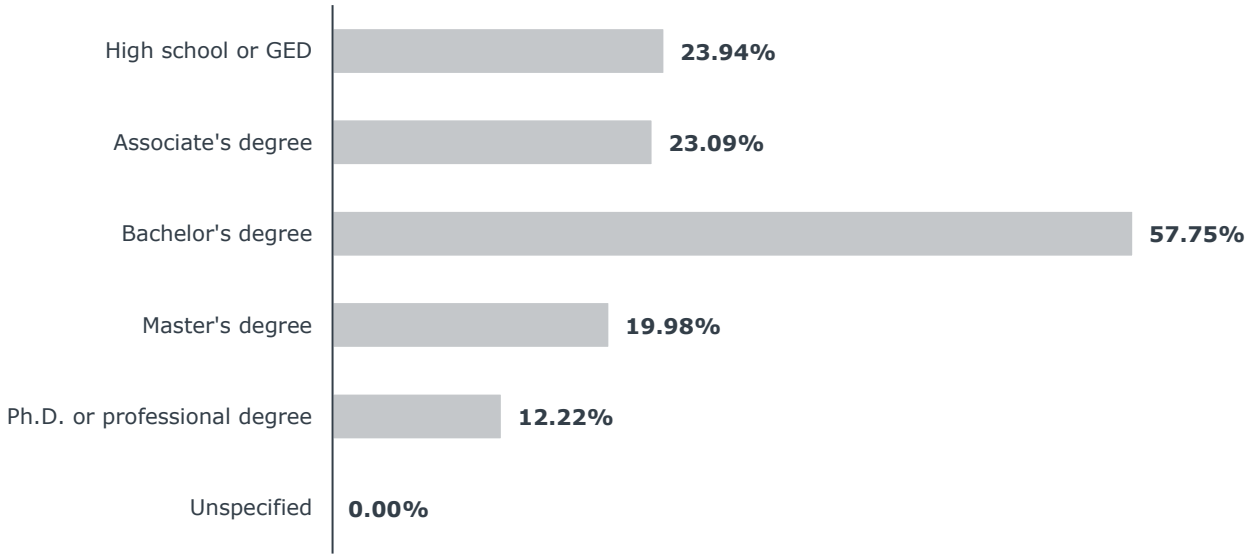
n = 1,804 job postings[1]



Education Levels Requested of Biomedical Engineering Applicants

April 2021 - March 2022, Regional Data

n = 5,752 job postings[1]



1) The n-value reflects the number of job postings requesting any degree level biomedical engineering applicants rather than the number of postings requesting master's-level biomedical engineering applicants.

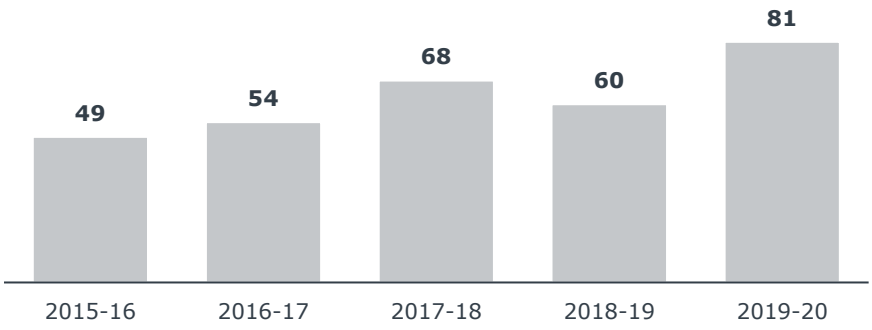
Source: EAB analysis. Emsi Analyst.

Local Analysis of CIP Code 14.0501 ("Bioengineering and Biomedical Engineering") Master's-Level Completions

Relevant degree completions increased 14.84% on average annually across the 2015-16 and 2019-20 academic years. In this same period, the number of institutions reporting completions remained relatively consistent (i.e., a net increase of one institution). The growth in student demand outpaced the growth in competition, indicating a favorable local competitive landscape and potential room for program launch.

Completions Reported over Time

2015-2016 to 2019-2020 Academic Years, Local Data



+14.84%

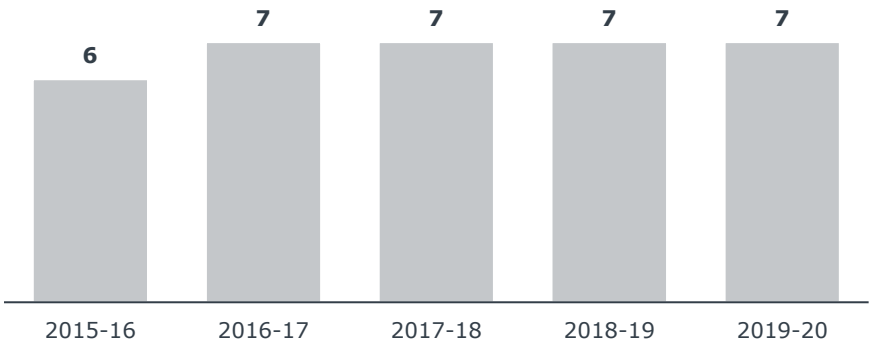
Average Annual Completions Growth

2015-2016 to 2019-2020 Academic Years, Local Data

- Average annual 4.17% growth in number of institutions in the same period.

Institutions Reporting Completions over Time

2015-2016 to 2019-2020 Academic Years, Local Data



0.00%

Institutions Reporting Completions with a 100% Distance-Delivery Option

2019-2020 Academic Year, Local Data

11.57

Mean Completions per Institution Reporting

2019-2020 Academic Year, Local Data

- An increase from the 8.17 mean completions reported in the 2015-2016 academic year.

5

Median Completions per Institution Reporting

2019-2020 Academic Year, Local Data

- An increase from the four median completions reported in the 2015-2016 academic year.

Source: EAB analysis. National Center for Education Statistics.

Local Analysis of CIP Code 14.0501 ("Bioengineering and Biomedical Engineering") Master's-Level Completions

Administrators should note the strong presence of Georgia Institute of Technology in the local competitive market. In the 2019-20 academic year, the institution held 61.73% of the market share (i.e., 50 completions). No other institution in the market reported more than 10 completions. Upon potential program launch, administrators should expect to face strong competition from Georgia Institute of Technology.

Institutions with Most Reported Completions

2015-2016 to 2019-2020 Academic Years, Local Data

Institution	Reported Completions, 2015-2016 Academic Year	Market Share, 2015-2016 Academic Year	Reported Completions, 2019-2020 Academic Year	Market Share, 2019-2020 Academic Year
Georgia Institute of Technology-Main Campus	27	55.1%	50	61.73%
Mercer University	5	10.2%	10	12.35%
Florida State University	3	6.12%	7	8.64%
Mississippi State University	3	6.12%	5	6.17%
University of Alabama at Birmingham	9	18.37%	4	4.94%
Emory University	2	4.08%	4	4.94%
Florida Agricultural and Mechanical University	Not Offered	0.0%	1	1.23%

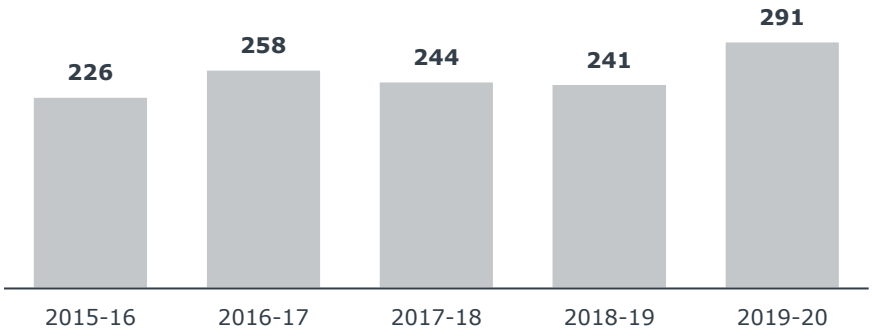
Source: EAB analysis. National Center for Education Statistics.

Regional Analysis of CIP Code 14.0501 ("Bioengineering and Biomedical Engineering") Master's-Level Completions

Relevant completions increased each year on average between the 2015-16 and 2019-20 academic years (i.e., a 7.06% average annual increase). In the same period, the number of institutions reporting relevant completions increased 2.44% on average annually. The growth in student demand outpaced the growth in competition, suggesting a favorable competitive landscape for program launch.

Completions Reported over Time

2015-2016 to 2019-2020 Academic Years, Regional Data



+7.06%

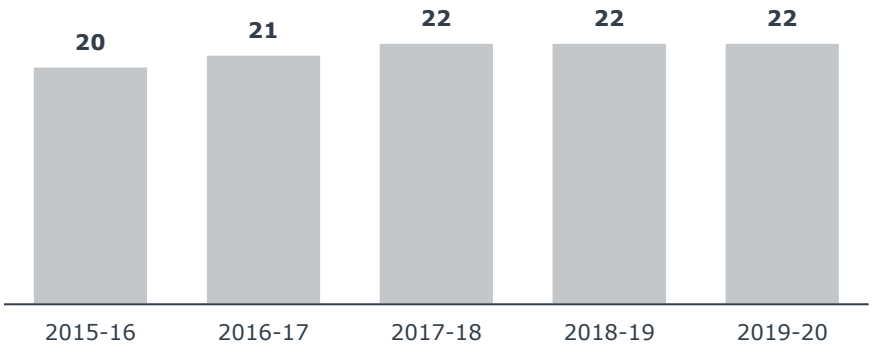
Average Annual Completions Growth

2015-2016 to 2019-2020 Academic Years, Regional Data

- Average annual 2.44% growth in number of institutions in the same period.

Institutions Reporting Completions over Time

2015-2016 to 2019-2020 Academic Years, Regional Data



0.00%

Institutions Reporting Completions with a 100% Distance-Delivery Option

2019-2020 Academic Year, Regional Data

13.23

Mean Completions per Institution Reporting

2019-2020 Academic Year, Regional Data

- An increase from the 11.30 mean completions reported in the 2015-2016 academic year.

8.50

Median Completions per Institution Reporting

2019-2020 Academic Year, Regional Data

- An increase from the eight median completions reported in the 2015-2016 academic year.

Source: EAB analysis. National Center for Education Statistics.

Regional Analysis of CIP Code 14.0501 ("Bioengineering and Biomedical Engineering") Master's-Level Completions

Between the 2015-16 and 2019-20 academic years, nine of the top 10 institutions increased the number of completions they report and seven increased their market share. In the 2019-20 academic year alone, the top five regional institutions held 61.17% of the total market share. The presence of strong market leaders suggests smaller or new programs may struggle to establish themselves in the competitive market.

Institutions with Most Reported Completions

2015-2016 to 2019-2020 Academic Years, Regional Data

Institution	Reported Completions, 2015-2016 Academic Year	Market Share, 2015-2016 Academic Year	Reported Completions, 2019-2020 Academic Year	Market Share, 2019-2020 Academic Year
Georgia Institute of Technology-Main Campus	27	11.95%	50	17.18%
Clemson University	32	14.16%	48	16.49%
University of Florida	31	13.72%	32	11.00%
Tulane University of Louisiana	14	6.19%	27	9.28%
University of Miami	18	7.96%	21	7.22%
Florida Atlantic University	5	2.21%	16	5.50%
Florida International University	7	3.10%	16	5.50%
University of South Florida	28	12.39%	12	4.12%
Mercer University	5	2.21%	10	3.44%
The University of Tennessee-Knoxville	6	2.65%	10	3.44%

Source: EAB analysis. National Center for Education Statistics.

II. Credential Design and Curriculum Analysis

Section Includes:

- Profiled Program Review
- Knowledge and Skills Heatmap
- Curriculum Analysis

Credential Design

Offer flexible coursework to attract more students. Two profiled programs (i.e., Purdue University and the University of Missouri) each offer their program online. The University of Missouri's online program includes synchronous coursework. Purdue University's program doesn't advertise synchronous or asynchronous courses specifically, but instead advertises the creation of individualized Plans of Study to meet each student's specific needs, workload, and schedule. Consider offering asynchronous or individualized program schedules in the proposed online program to better meet the needs of students. Programs with flexible options appeal to millennial students concerned with balancing family and work-related commitments and further education.

Consider incorporating additional degree pathways to align with competitors and increase program rigor. Three profiled programs offer multiple or unique degree pathways for students to complete the program. North Carolina State University offers a joint program with the University of North Carolina at Chapel Hill, and the University of Maryland offers two dual degree programs (i.e., B.S. / M.S. and M.S. / M.D.). Further, the University of Missouri allows nondegree-seeking students to enroll in up to 12 program credits that can later be applied to the full program. Auburn University could draw from their existing biosystems engineering and biomedical science majors to create dual degree pathways.

Curriculum

Provide curricular customization opportunities through elective courses and degree concentrations to align with competitors. Two profiled programs (i.e., the University of Illinois Urbana-Champaign and Purdue University) offer concentration areas within their degree programs. However, administrators should note that biomedical engineering is a concentration within Purdue University's broader interdisciplinary engineering degree and doesn't include more specific concentrations within biomedical engineering. The University of Illinois Urbana-Champaign's program offers two optional concentrations in biomechanics and cancer nanotechnology. EAB research finds students seek programs with opportunities for personalization to help them achieve their specific goals.

Confer software engineering skills through coursework to stand out from competitors and better prepare graduates for job opportunities. No profiled programs offered courses conferring software engineering and programming skills. However, between April 2019 and March 2022, skills such as "C++ (Programming Language)" and "Python (Programming Language)" were increasingly requested by employers regionally. Offering a course conferring software engineering and development skills would help Auburn University stand out amongst competitors and prepare students for a wider range of professional opportunities post-graduation.

Potential Graduate Outcomes

Advertise graduate outcomes to align with competitors and attract career-minded students. Three profiled programs advertise potential graduate outcomes through alumni stories, sample employer information, and employment growth statistics. Prospective students show increased interest in program marketing that emphasizes returns-on-investment through graduate employment outcomes. Auburn University could leverage information from the Bureau of Labor Statistics to bolster their potential program webpage.

Experiential Learning Requirements

Offer experiential learning opportunities to align with from competitors and demonstrate program value. Four of five programs offer experiential learning for students. Three programs offer the opportunity for students to complete a thesis, but only the University of Maryland requires thesis research. North Carolina State University provides experiential learning through experiential coursework and mentorship opportunities. Through their series of "Biomedical Innovation and Entrepreneurship" courses, students can design their own biomedical devices and visit local laboratories. To stand out from competitors, Auburn University could offer a similar style of coursework to prepare students for real experiences in the biomedical engineering field. While bringing the proposed program online, consider utilizing digital simulations and virtual labs to incorporate experiential learning into the program.

Analysis of Profiled Program Design

Profiled programs require 30 to 40 credits and are completed in 11 months to five years. Two programs are offered online while three are offered face-to-face. On average, programs cost $24,474 for students in-state and $42,034 for students out-of-state. Additionally, three programs offer multiple pathways for program enrollment and completion. No profiled programs advertised specific program accreditation.

Profiled Program Characteristics

Partner Selected Comparators

Title	***Purdue University*** Interdisciplinary Master's in Engineering, Biomedical Engineering Concentration	***North Carolina State University*** M.S. in Biomedical Engineering/ MedTech	***University of Missouri*** M.S. in Biological Engineering	***University of Illinois Urbana-Champaign*** M.S. in Bioengineering	***University of Maryland*** M.S. in Bioengineering
Modality	Online	Face-to-face	Online (synchronous)	Face-to-face	Face-to-face
Time to Completion	N/A	11 months	Two to three years	N/A	Two years (maximum of five years)
Other Degree Pathways	N/A	Joint program with the University of North Carolina at Chapel Hill	N/A	The University of Missouri allows nondegree-seeking students to enroll in up to 12 credits of courses	• B.S./M.S. • M.S/M.D.
Credits	30 credits	30 credits	30 credits	32 to 40 credit hours	30 credits
Advertised Tuition[1]	• $1,139 per credit in-state • $1,459 per credit out-of-state	• $505 per credit in-state • $1,572 per credit out-of-state	$979 per credit	N/A	• $812 per credit in-state • $1,769 per credit out-of-state
Estimated Total Program Tuition[2]	• $34,170 in-state • $43,770 out-of-state	• $15,150 in-state • $47,160 out-of-state	$29,372	• $19,320 in-state • $36,798 out-of-state	• $24,360 in-state • $53,070 out-of-state

1) Advertised tuition indicates the tuition cost as presented on the program website. Program fees are not included given the significant variance in institutional fees.
2) Estimated total program tuition calculates the tuition for full program completion (e.g., total credits awarded, total length of program time) depending on tuition unit.

Source: EAB analysis. Comparator Program Websites.

Admission Requirements

All profiled programs require applicants to submit a statement of purpose and letters of recommendation. Three programs require applicants to submit a resume. The University of Missouri may require students to complete an interview, while the University of Illinois Urbana-Champaign encourages applicants to reach out to program faculty to explore alignment of interests during the application process. Additionally, three profiled programs advertise GRE scores as optional for applicants. To align with competitors, Auburn University should also make GRE scores optional for applicants.

Purdue University

- Statement of purpose
- Official transcripts
- Three letters of recommendation
- Resume
- Undergraduate degree from an ABET-accredited engineering program

OR

- Bachelor's degree in a related field with two engineering calculus courses and a differential equations/linear algebra course

North Carolina State University

- Transcripts documenting an undergraduate or graduate degree in engineering or quantitative science
- Personal statement
- Three letters of recommendation
- Optional GRE scores

University of Missouri

- Bachelor's degree from a regionally accredited institution in a STEM field
- Minimum 3.0 GPA
- Interview may be required
- Unofficial transcripts
- Statement of purpose
- Three letters of recommendation
- Resume

University of Illinois Urbana-Champaign

- 3.0 GPA
- Unofficial transcripts
- Three letters of recommendation
- Statement of purpose
- Resume
- Research background preferred
- Although not required, applicants are encouraged to reach out to program faculty to learn how their research aligns with student interests
- Optional GRE scores

University of Maryland

- Bachelor's-degree in a science or engineering discipline from an accredited institution (students with non-engineering backgrounds must have prerequisite courses such as Calculus I, II, III, and Differential Equations)
- Transcripts
- Statement of research goals and interests
- Personal history statement (optional)
- Letters of recommendation
- Optional GRE scores

Experiential Learning

Four of five programs offer experiential learning for students. Three programs offer the opportunity for students to complete a thesis, but only the University of Maryland requires thesis research. North Carolina State University provides experiential learning through immersive coursework and mentorship opportunities.

Purdue University

Purdue University offers both **thesis and non-thesis tracks** in its interdisciplinary engineering program.

University of Illinois Urbana-Champaign

The University of Illinois Urbana-Champaign offers both **thesis and non-thesis tracks**. The thesis track includes four credits of research and is completed under the guidance of a thesis advisor.

University of Maryland

The University of Maryland requires students to complete six credits of **thesis research**. Upon completion, the student must publicly present the dissertation to the thesis committee and the general public. Then, the student completes a formal examination in which the thesis committee ask the student~~s~~ questions about the research.

North Carolina State University

- Multiple **courses** in the program at North Carolina State University follow an immersive and experiential format. For example, the "Biomedical Innovation and Entrepreneurship I – Needs Discovery" course includes exposure to healthcare environments and follows a series of seminars, and the "Biomedical Innovation and Entrepreneurship III – Product Development" course includes frequent visits to local biotech companies and prototyping facilities.
- The program also advertises **mentorship** from biotech entrepreneurs, legal scholars, and venture partners.

Local Analysis of Job Postings' Skill Requirements for Master's-Level Biomedical Engineering Professionals

Across April 2019 to March 2022, employers demonstrated sustained demand for skills such as "medical devices" and "biomedical engineering." Emerging skills include "pharmaceutical manufacturing" and "biotechnology"; developing these skills will prepare graduates to meet today's employer needs.

Knowledge and Skills Heatmap for Biomedical Engineering

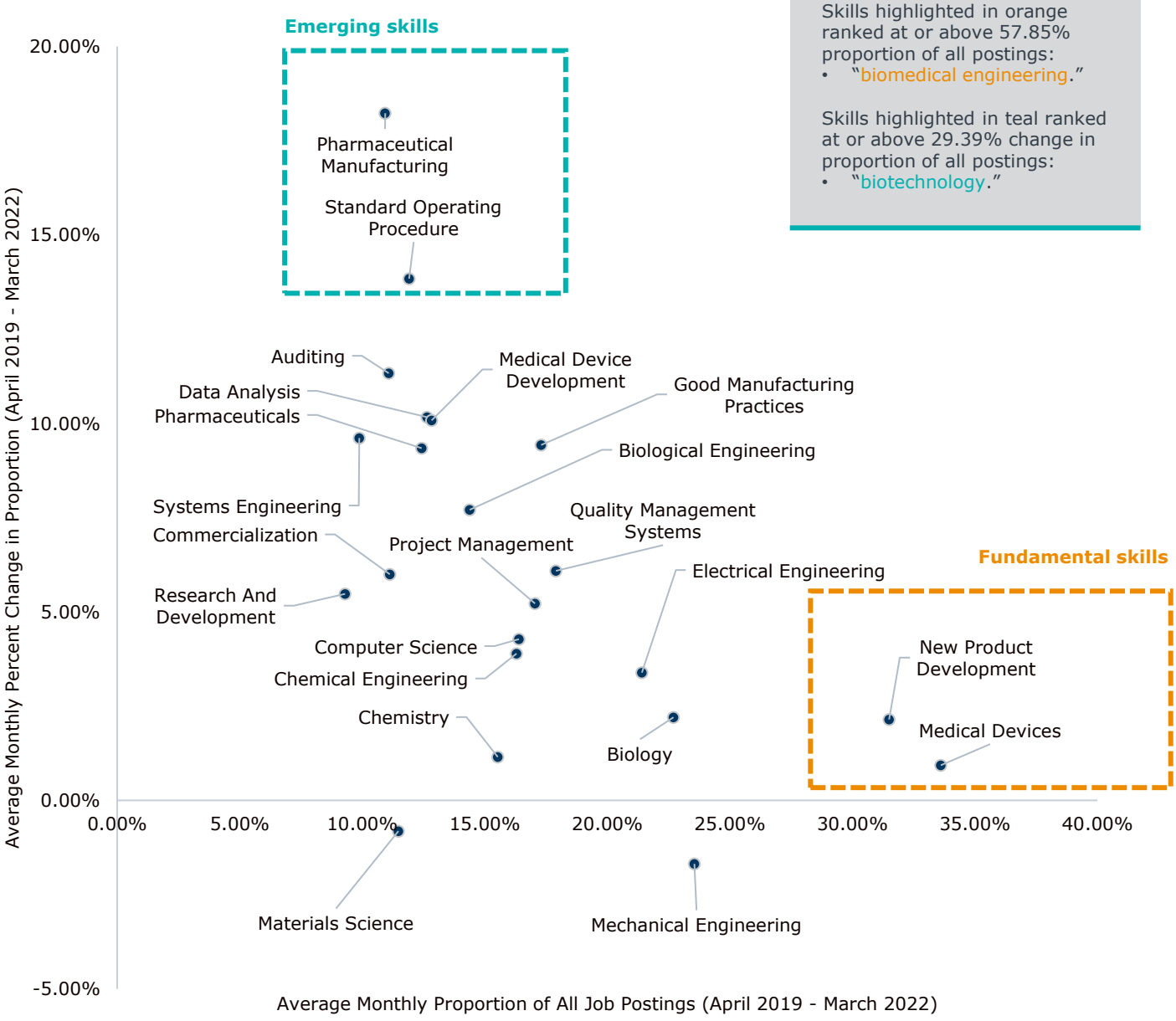
April 2019 to March 2022, Local Data

n= 1,804 job postings

The Forum excluded the following skills from the heat map to improve readability.

Skills highlighted in orange ranked at or above 57.85% proportion of all postings:
- "biomedical engineering."

Skills highlighted in teal ranked at or above 29.39% change in proportion of all postings:
- "biotechnology."



Source: EAB analysis. Emsi Analyst.

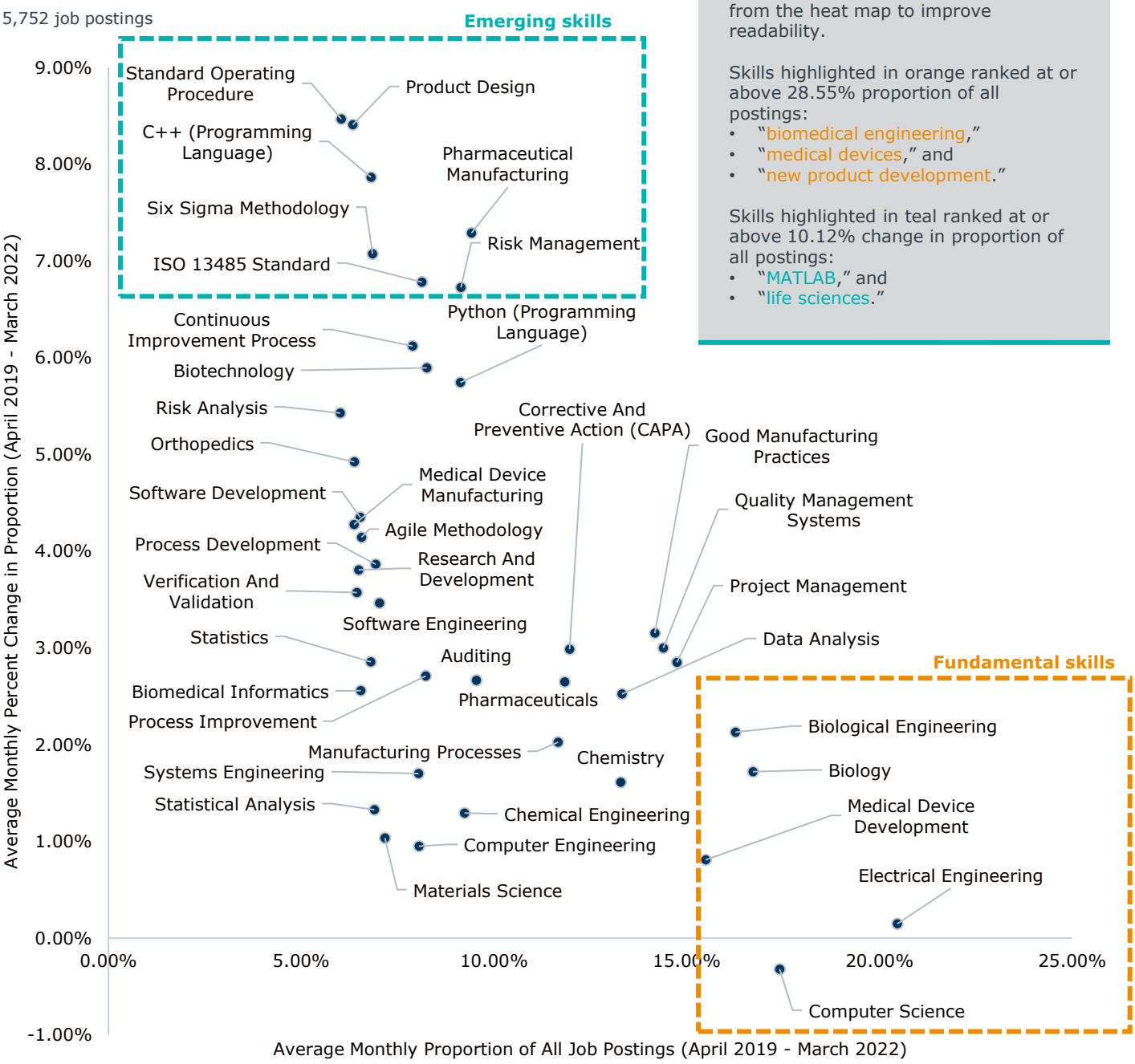
Regional Analysis of Job Postings' Skill Requirements for Master's-Level Biomedical Engineering Professionals

Across April 2019 to March 2022, employers demonstrated sustained demand for skills such as "medical device development" and "computer science." Emerging skills include "product design" and "C++ (programming language)"; developing these skills will prepare graduates to meet today's employer needs.

Knowledge and Skills Heatmap for Biomedical Engineering

April 2019 to March 2022, Regional Data

n= 5,752 job postings



The Forum excluded the following skills from the heat map to improve readability.

Skills highlighted in orange ranked at or above 28.55% proportion of all postings:
- "biomedical engineering,"
- "medical devices," and
- "new product development."

Skills highlighted in teal ranked at or above 10.12% change in proportion of all postings:
- "MATLAB," and
- "life sciences."

Source: EAB analysis. Emsi Analyst.

Alignment of In-Demand Skills to Profiled Programs' Curricula

Local and Regional Data

	In-Demand Skills	Sample Courses at Profiled Institutions
Research & Clinical Trials	• "Data Analysis" • "Research and Development" • "Statistics" • "Bioinformatics"	• "Preclinical and Clinical Study Design" at Purdue University • "Numerical Methods in Engineering Research" at the University of Missouri • "Analytical Methods in Bioengineering" at the University of Illinois Urbana-Champaign
Software Engineering	• "Computer Science" • "Software Development" • "C++ (Programming Language)" • "Python (Programming Language)"	No profiled programs offer coursework aligning with software engineering skills
Medical Device Engineering & Manufacturing	• "Good Manufacturing Practices" • "Medical Device Development" • "Pharmaceutical Manufacturing"	• "Medical Device Materials and Manufacturing" at North Carolina State University • "Design and Development of Biomedical Innovation" at the University of Missouri

Trends in Profiled Programs' Curricula

Concentrations

- The University of Illinois Urbana-Champaign offers concentrations in biomechanics and cancer nanotechnology

Profiled programs' full curricula can be found in Appendix A on page 28.

Source: EAB analysis. Comparator Program Websites.

Appendix A: Sample Biomedical Engineering Curricula

Master's in Interdisciplinary Engineering, Biomedical Engineering Concentration, Purdue University

Biomedical Engineering Courses (Students choose six credit hours)

- Introduction to Biomaterials
- Biomedical Signal Processing
- Biosensors: Fundamentals and Applications
- Tissue Engineering
- Polymeric Biomaterials
- Human Motion Kinetics
- Fundamental of MEMS & Micro-Integrated Systems
- Medical Imaging & Diagnostics Technologies
- Magnetic Resonance Imagine

Regulatory Sciences Courses (students choose three credit hours)

- Preclinical and Clinical Study Design
- Regulatory Issues Surrounding Approvals Biomedical Devices
- Quality Systems for Regulatory Compliance
- Ethical Engineering of Medical Devices

Life Sciences Courses (students choose three credit hours)

- Neural Mechanisms of Health and Disease
- Introduction to Clinical Medicine

Quantitative/Analytical Courses (students choose three credit hours)

- Biostatistics
- Continuum Models in Biomedical Engineering
- Random Variables and Signals
- Lumped System Theory
- Industrial Applications of Statistics
- Linear Algebra with Applications
- Introduction to Complex Analysis
- Advanced Mathematics for Engineers and Physicists I & II
- Design of Experiments
- Statistical Inference

Students must complete 15 additional credits of engineering or related non-engineering elective courses

M.S. in Biomedical Engineering/MedTech, North Carolina State University

- Biomedical Innovation and Entrepreneurship I – Needs Discovery
- Biomedical Innovation and Entrepreneurship II – Design & Innovation
- Technology Evaluation and Commercialization
- Medical Device Materials and Manufacturing
- Global Regulatory Affairs for Medical Products
- Biomedical Innovation and Entrepreneurship III – Product Development
- Technology Evaluation and Commercialization II
- Venture Opportunity Analysis Analytics
- One Technical Elective

M.S. in Biological Engineering, University of Missouri

Required Courses (Six credits)

- Numerical Methods in Engineering Research
- Statistical Methods in the Health Sciences

Students choose 12 credits from the following courses:

- Problems in Biological Engineering
- Materials Characterization Techniques
- Orthopedic Failure Modes and Effect Analysis
- Scientific Discover Leading to Life Science Innovations
- Advanced Topics in Biological Engineering
- Design and Development of Biomedical Innovations

Students choose 12 credits from the following courses:

- Brain Signals and Brain Machine Interfaces
- Food Process Engineering
- Orthopedic Biomechanics
- Physics and Chemistry of Materials
- Biomedical Optics
- Introduction to Biomedical Imaging
- Regulatory Issues in Clinical Research and Clinical Trials
- Topics in Biological Engineering (Non-Ionizing Techniques)
- Topics in Biological Engineering (Ionizing Techniques)
- Zero Hunger Challenge
- Computational Neuroscience
- Commercialization of Life Science Innovations

M.S. in Bioengineering, University of Illinois Urbana-Champaign

Core Courses (21 credits)

- Bioengineering Seminar Series
- Seminar Discussion
- Bioengineering Professionalism
- Analytical Methods in Bioengineering
- Computational Bioengineering
- Advanced Bioinstrumentation
- Bioengineering Research
- Current Topics in Biomedical Imaging

Non-thesis students choose 19 additional credits of elective coursework, while thesis students complete seven credits of electives and a four-credit research course.

Biomechanics Concentration Courses (students choose 12 credits)

- Biological Nanoengineering
- Bone Biology and Biomechanics
- Cancer Nanotechnology
- Musculoskeletal Tissue Mechanics
- Mechanobiology
- Biomaterials and Nanomedicine
- Biological Physics
- Cellular Biomechanics

Cancer Nanotechnology Concentration (students choose 12 credits)

- Cancer Nanotechnology
- Cancer Cell Biology
- Cancer Science and Technology
- Biological Nanoengineering
- Biosensors
- Intro to Electromechanical Devices and Systems
- Basic Toxicology
- Mechanobiology
- MEMS-NEMS Theory and Fabrication
- Mechanics of MEMS and NEMS

M.S. in Bioengineering, University of Maryland

Core Courses:

- Rate Processes in Biological Systems
- Transport Phenomena in Bioengineering Systems
- Physiological Evaluation of Bioengineering Designs

Students choose one of the following elective courses:

- Cellular and Tissue Biomechanics
- Tissue Engineering
- Biosensor Instrumentation and Techniques
- Biophotonic Imaging and Microscopy
- Protein Design and Engineering
- Computational Molecular Bioengineering
- Bioengineering Devices for Cancer Research
- Biomaterials in Immunology and Immunotherapy

Students choose 12 additional credits in unlisted elective courses

Appendix B: Research Process and Sources

EAB conducted a three-part analysis to identify opportunities to inform a proposed program's curriculum and positioning.

All workforce demand data was collected from Emsi, EAB's labor market intelligence partner. Competitive data was collected from the National Center for Education Statistics via the Emsi Analyst platform.

1

Step One: Labor Market Analysis

This report includes an analysis of external labor market needs to determine demand for program graduates. Researchers evaluate historical job postings and future employment projections to determine if the labor market supports program growth.

2

Step Two: Competitive Landscape Analysis

The volume and growth of degree conferrals serves as an indicator of student demand for the program being evaluated. Researchers use conferral data to determine if the selected program is facing a crowded market or if it may struggle to attract students due to declining student interest.

3

Step Three: Comparator Program Analysis

Researchers analyzed how the design and curricula of similar programs aligns with the program being audited. The researchers collect information publicly available on profiled programs' webpages.

Research Methodology

EAB's market insights research guides strategic programmatic decisions at partner institutions. The Market Insights Service combines qualitative and quantitative data to help administrators identify opportunities for new program development, assess job market trends, and align curriculum with employer and student demand.

Unless stated otherwise, this report includes data from online job postings from April 2021 – March 2022. To best estimate employer demand for master's-level biomedical engineering professionals, the Forum analyzed job postings for master's-level professionals with relevant skills (e.g., "biomedical engineering," "biomedical technology").

Definitions

- "CIP" code refers to the Classification of Instructional Programming code.
- "Local" and "locally" refers to the counties within a 200-mile radius of Auburn University.
- "Region" and "regionally" refers to Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Tennessee.

Research Questions

This report answers the following questions:

- How has demand for graduates of my program evolved over time?
- In what positions do employers demonstrate the greatest need for graduates?
- In which industries should the program prepare students to work?
- What skills should the program teach to prepare students to meet employer demand?
- Which employers demonstrate the greatest demand for graduates?
- In which cities do employers demonstrate the greatest demand for potential graduates?
- What experience level do employers most frequently request from program graduates?
- What education level do employers most frequently request from program graduates?
- How many students graduate from similar programs regionally, and how has this changed over time?
- How are similar programs structured?
- How are similar programs delivered?
- What experiential or practical learning do similar programs offer?
- What courses are included in the curricula of similar programs?
- What accreditation do similar programs hold?

Research Limitations

Because institutions self-report data to the NCES, some comparable and competitor programs may have chosen to report completions for master's-level biomedical engineering programs under an alternate CIP code and may not be included in the analysis.

Project Sources

The Forum consulted the following sources for this report:

- EAB's internal and online research libraries
- Emsi Analyst, described below
- U.S. Bureau of Labor Statistics
- U.S. National Center for Education Statistics (NCES)

Labor Market Intelligence Partner: Emsi

This report includes data made available through EAB's partnership with Emsi (formerly Economic Modeling Specialists International), a labor market analytics firm serving higher education, economic development, and industry leaders in the U.S., Canada and the United Kingdom.

Emsi curates and maintains the most comprehensive labor market data sets available for academic program planning, providing real-time job posting data, workforce and alumni outcomes data, and traditional government sources of data. Under this partnership, EAB may use Emsi's proprietary Analyst™ and Alumni Insight™ tools to answer partner questions about employer demand, the competitive landscape, in-demand skills, postings versus actual hires, and skills gaps between job postings and professionals in the workforce. The Emsi tools also provide EAB with in-depth access to unsuppressed, zip-code-level government data for occupations, industries, programs, and demographics. For more complete descriptions of the Emsi tools, visit:

- http://www.economicmodeling.com/analyst/
- https://www.economicmodeling.com/alumni-insight/

To learn more about Emsi and its software and services, please contact Bob Hieronymus, Vice President of Business Development at bob.hieronymus@economicmodeling.com or (208) 883-3500.

Profiled Institutions

The Forum profiled programs via secondary research at the following institutions. The Forum profiled partner-selected comparators in this report.

A Guide to Institutions Profiled in this Brief

Partner-Selected Comparators

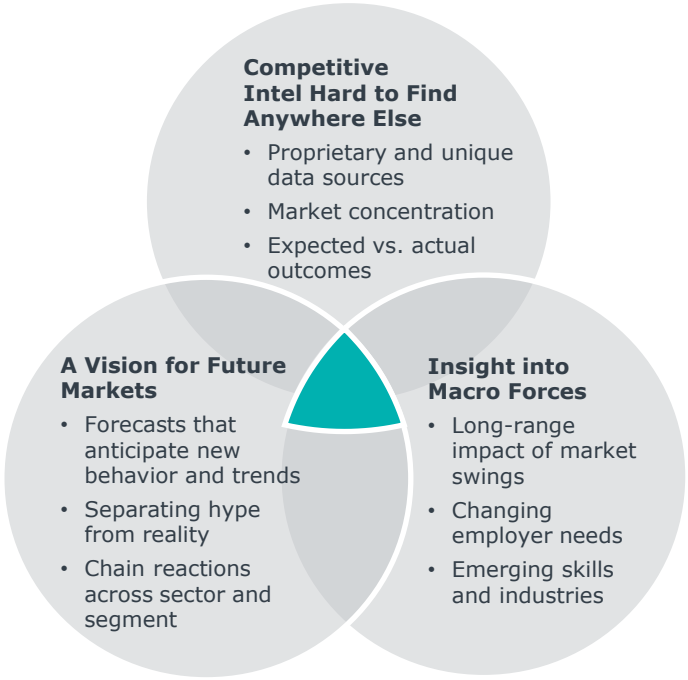
Institution	Location	Approximate Institutional Enrollment (Undergraduate / Total)	Carnegie Classification
Purdue University	Great Lakes	(35,500 / 46,500)	Doctoral Universities: Very High Research Activity
North Carolina State University	Southeast	(26,000 / 36,000)	Doctoral Universities: Very High Research Activity
University of Missouri	Southeast	(23,500 / 31,000)	Doctoral Universities: Very High Research Activity
University of Illinois Urbana-Champaign	Great Lakes	(33,500 / 52,500)	Doctoral Universities: Very High Research Activity
University of Maryland	Mideast	(31,000 / 41,000)	Doctoral Universities: Very High Research Activity

- Profiled program webpages
  - Purdue University, Interdisciplinary Master's in Engineering, accessed July 2022: https://engineering.purdue.edu/online/programs/masters-degrees/interdisciplinary-engineering/biomedical-engineering
  - North Carolina State University, M.S. in Biomedical Engineering/MedTech, accessed July 2022: https://bme.unc.edu/graduate/master-of-science-program/
  - University of Missouri, M.S. in Biological Engineering, accessed July 2022: https://online.missouri.edu/degrees-programs/mu/engineering/biological-engineering/ms
  - University of Illinois Urbana-Champaign, M.S. in Bioengineering, accessed July 2022: https://bioengineering.illinois.edu/academics/graduate/MS
  - University of Maryland, M.S. in Bioengineering, accessed July 2022: https://sites.google.com/eng.umd.edu/bioe-graduate-handbook/m-s-program?authuser=0

Source: EAB analysis. National Center for Education Statistics.

Blueprint for Growth: EAB's Signature Research

What Makes Our Advice So Valuable



New: Enrollment Scenario Explorer

Analyze institution-specific demographic and competitive performance and forecasts

Continuous, Updated Insight as Markets Change

- The Master's Market Slowdown — *2019*
- Resizing the Adult Degree Completion Market
- Certificate Market Risks and Opportunities
- Generation C: Students of the Pandemic
- Master's Market Competitive Intelligence — *2020*
- The Future of Undergraduate Enrollment
- The Shifting International Landscape
- Sizing the Alternative Provider Market — *2021*
- Strategy for a Post-Vaccine World
- The Future of the Enrollment Landscape — *Forthcoming*

Blueprint for Growth is EAB's signature research series about the future of enrollment, both undergraduate and graduate, domestic and international. We make bold predictions to shape our partners' future strategy, based on cross-cutting and holistic market analysis. Our analysis goes beyond market sizing to uncover hidden risks and opportunities and the changing dynamics of competition. This ongoing research continues to offer new insights into student markets. Ask you Strategic Leader to connect with our experts for the latest lessons and how those impact your program and portfolio strategy.

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