New Program Proposal
Bachelor of Science in Medical Biology
Lander University

Summary

Lander University requests approval to offer the program leading to the Bachelor of Science in Medical Biology in Fall, 2022. The proposed program is to be offered through face-to-face delivery. The following chart outlines the stages of approval for the proposal. The Advisory Committee on Academic Programs (ACAP) voted unanimously to recommend approval of the proposal. The full program proposal and support documents are attached.

Stages of Consideration	Date	Comments
Program Proposal Received	10/1/21	Not applicable.
Staff Comment to the Institution	10/13/21	Staff requested revisions of the proposal to clarify about the employment opportunities and budget.
Proposal Resubmitted	10/26/21	No comments.
ACAP Consideration	11/18/21	Representatives from Lander University introduced the program proposal, citing that various professional health care programs have specific prerequisites that do not necessarily fit into the curriculum of a traditional B.S. in Biology. Students completing a traditional biology major who are also trying to complete specific requirements for a subsequent medical program often must take more than the requisite 120 credit hours. This proposed program will allow these students to complete all necessary coursework within the 120 credit limit. In addition, the curriculum is based on recent guidelines of the Association of American Medical Colleges (AAMC) and the Howard Hughes Medical Institute (HHMI). Moreover, the program will allow students to meet all degree requirements and their professional school prerequisites within 120 credit hours. No new full-time teaching faculty members are needed. ACAP members inquired about the absence of upper-level courses in Molecular Biology. The institution representatives addressed that courses are available, and the design is to provide students opportunities to choose from upper-level courses as electives to satisfy the requirements for their career pathways. With no remaining discussion, ACAP voted unanimously to approve the program proposal.

Recommendation

Staff recommends the Committee on Academic Affairs and Licensing favorably commend to the Commission the program leading to the Bachelor of Science in Medical Biology at Lander University in Fall, 2022.

Lander University Undergraduate Student and Program Data

Undergraduate In-State/Out-of-State Enrollment, Fall 2018	2,717(91.48%) / 253(8.52%)
Number of Approved Programs in 10 Yrs. (FY 2010- 2019)	10
Number of Terminated Programs in 10 Yrs. (FY 2010- 2019)	7

Industry related Occupational Wages and Projections in South Carolina, 2018 – 2028*

Occupational Field[1]	2018 Median Income[2]	2018 Estimated Employment[3]	2028 Projected Employment	Total 2018-2028 Employment Change	2018-2028 Annual Avg. Percent Change	Total Percent Change
Healthcare Practitioners and Technical [4]	$72,234	129,983	143,393	13,410	0.99%	10.32%

[1] "Occupational Field" represents the closest related occupation category that includes the occupations aligned with the program proposal.
[2] SC Department of Employment & Workforce (DEW), Labor Market Information. (2020). Occupational Employment and Wage Rates (OES) for All Major Groups in South Carolina in 2019 [Data file]. Retrieved from https://jobs.scworks.org/vosnet/lmi/default.aspx?pu=1.
[3] SC Department of Employment & Workforce (DEW), Labor Market Information. (2020). Occupational Projections (Long-term) for Multiple Occupations in South Carolina in 2018-2028 [Data file]. Retrieved from https://jobs.scworks.org/vosnet/lmi/default.aspx?pu=1
[4] Total median income for the following categories is adjusted to accommodate occupations with missing median income data.
* Data downloaded December 18, 2020; Most recent data available.

NEW PROGRAM PROPOSAL FORM

Name of Institution: Lander University

Name of Program (include degree designation and all concentrations, options, or tracks):
Bachelor of Science (B.S.) in Medical Biology

Program Designation:

- ☐ Associate's Degree
- ☐ Master's Degree
- ☒ Bachelor's Degree: 4 Year
- ☐ Specialist
- ☐ Bachelor's Degree: 5 Year
- ☐ Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA)
- ☐ Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.)

Consider the program for supplemental Palmetto Fellows and LIFE Scholarship awards?

- ☒ Yes
- ☐ No

Proposed Date of Implementation: Fall 2022

CIP Code: 26.0101 Biology/Biological Sciences, General

Delivery Site(s): 50401 Lander University Main Campus (Greenwood)

Delivery Mode:

- ☒ Traditional/face-to-face
  *select if less than 25% online
- ☐ Distance Education
  - ☐ 100% online
  - ☐ Blended/hybrid (50% or more online)
  - ☐ Blended/hybrid (25-49% online)
  - ☐ Other distance education (explain if selected)

Program Contact Information (name, title, telephone number, and email address):

Dr. Timothy Maze Professor of Biology 864-388-8153 tmaze@lander.edu	Dr. David Slimmer Dean, College of Science and Mathematics 864-388-8386 dslimmer@lander.edu

Institutional Approvals and Dates of Approval (include department through Provost/Chief Academic Officer, President, and Board of Trustees approval):

1. Department: March 10, 2020
2. College: September 20, 2021
3. Curriculum Committee: September 17, 2021
4. Faculty Senate: September 21, 2021
5. Dean's Council September 30, 2021
6. Provost October 1, 2021

7. President: October 1, 2021
8. Board of Trustees: December 14, 2021

Background Information

Nature and Purpose of the Program

The Department of Biology is proposing a Bachelor of Science in Medical Biology to begin in Fall 2022. This program will address the growing demand for students entering careers in the health professions. The aim of the Medical Biology degree is to prepare students for successful entrance and completion into professional health care programs or to enter the work force in a health care career.

The Medical Biology degree is a modified version of our current biology degree that addresses some of the challenges faced by our students who desire to work in health care fields. We have identified two barriers that are addressed by adding the Medical Biology degree to our department:

1. **Biology prerequisites required for professional schools should be included in the degree program's curriculum**. This proposed degree will save students time and money. Various professional health care programs have specific prerequisites that do not necessarily fit into the curriculum of a traditional B.S. in Biology. The result for many of our current Biology majors seeking future enrollment in a health care-related professional school is that to meet the requirements of the degree and their long-term goals they must complete more hours than are required for most degrees at Lander University and they must complete a higher number of credit hours each semester to stay on track to graduate with their academic class. The goal of the Medical Biology program is to permit students to meet all degree requirements and their professional school prerequisites within 120 credit hours.
2. **Offer distinct courses that prepare students for professional schools or entry into a health care career.** Creating a new degree program provides an opportunity to add specialized courses relevant to students interested in medical careers but which may not be applicable to general biology students. The goal of our B.S. in Biology program is to provide graduates with a wide range of knowledge and experiences in biology, which is accomplished by a broad range of classes. The goals of the proposed B.S. in Medical Biology will be more focused on concepts that are directly related to health care careers.

Target Audience

The target audience of the Medical Biology program at Lander University will be highly motivated, full-time students who have identified an interest in pursuing a post-graduate health-related career field, such as medicine, dentistry, physical therapy, physicians associate (PA), optometry, and occupational therapist. This new program's curriculum will embrace the guidelines recommended by the Association of American Medical Colleges (AAMC) and the Howard Hughes Medical Institute (HHMI) by focusing on natural, physical, and mathematical sciences relevant to medical education and to the practice of medicine, such as human anatomy and physiology, microbiology, pathophysiology, and biostatistics. Coursework relevant to health sciences will not only prepare the students for professional degrees in health care, but also engage these students creating a direct connection their future career. The students in the Medical Biology program will ultimately have an educational experience at Lander University that will help prepare them for success in the rigorous and integrative learning environment of most health care programs.

Centrality to Lander University Mission and Relation to the Strategic Plan

The Medical Biology program aligns very well with Lander University's Strategic Plan (2016). The university Strategic Plan's Mission Statement includes "Lander University offers high-demand and market-driven programs to ambitious and talented students in South Carolina and beyond." Degree programs that address the growing needs of health care fields are based on the same "high-demand" and "market-driven" programs our university strives to offer.

Lander University's Strategic Plan is comprised of Ten Pillars. The Medical Biology degree directly supports the first four strategic plan pillars:

1. Strategic Plan Pillar 1: High-Demand Market-Driven Programs. Careers in health care continue to have a strong outlook in the future.
2. Strategic Plan Pillar 2: Selective, Competitive Recruitment and Enrollment of Ambitious and Talented Students. Students seeking careers in health care fields are often the same ambitious and talented students Lander University seeks to enroll.
3. Strategic Plan Pillar 3: Robust Student Experience including "Superior Student Advising". The Medical Biology advising program includes faculty membership to the National Association of Advisors for Health Professions to ensure advisors are current on any developments in the best practices for the different health professional careers. The advising program is enhanced by a series of seminar courses built into the curriculum that addresses various aspects of becoming a health care professional (e.g. ethics in the workplace, exposure to clinical experiences, creating a personal statement, and interviewing skills).
4. Strategic Plan Pillar 4: Graduates Who are Gainfully Employed or Admitted to Graduate School. The sole purpose of the degree program is to either have students admitted into professional schools or directly position themselves to enter a health care field.

Assessment of Need

Provide an assessment of the need for the program for the institution, the state, the region, and beyond, if applicable.

More than 150,000 people in South Carolina are employed in hundreds of different Health Science occupations. As our elderly population increases, so does the high demand for careers in Health Science. In the next 25 years, the number of people aged 65 or older in South Carolina is expected to rise to more than one million. Older people need more healthcare, which is why our state will need more healthcare workers. Healthcare jobs are projected to grow 14% between 2018 and 2028, according to the Bureau of Labor Statistics (BLS). That's nearly three times the average growth rate for all other occupations. Of the 10 fastest-growing jobs in the U.S., six are in healthcare. Since the inception of this proposal, the State of South Carolina and the world have experienced the COVID-19 pandemic, thus the demand for healthcare workers has drastically increased.

Institutional Need

Set to start in Fall 2022, the Department of Biology is proposing a Bachelor of Science in Medical Biology to address the growing demand of students entering careers in the health sciences. The Medical Biology degree program will still provide graduates with a broad, robust foundation in biology but creates an opportunity to add specialized courses designed to prepare students for medical school and for other healthcare professional programs such as dentistry, PA, and physical therapy. Employment in healthcare and social assistance in the United States is projected to add the most jobs of all industry sectors, about

3.3 million jobs between 2020–2030. Factors that are expected to contribute to the large increase include rising demand for the care of an aging baby-boom population, longer life expectancies, and continued growth in the number of patients with chronic conditions. The curriculum is based on recent guidelines of the Association of American Medical Colleges (AAMC) and the Howard Hughes Medical Institute (HHMI). It focuses on competencies in the natural and social sciences relevant to medical education and to the practice of medicine. This program will emphasize the development of critical thinking and communication skills, as well as competency in experimental design, data analysis and methodology for lab and field research.

Additionally, the Medical Biology degree program will permit students to meet all degree requirements and their professional school prerequisites within 120 credit hours. Specialized career-focused courses would fit into their curriculum and would prevent students from taking higher numbers of credit hours each semester to stay on track to graduate with their academic class. When students graduate from the Medical Biology degree program, they will bring experiences with them that go beyond memorization and mastery of material. They will have spent time working toward goals in the program that put their skills and talents to the test, pushed them to leave their comfort zones, and shaped empathetic professionalism, setting them up for better success in matters outside the classroom. Because of the current curriculum and specific vision of the Medical Biology program, Lander is already equipped to sustain the initial launch of the program and support students with the physical space and equipment needed to succeed.

State and Regional Need
One of the goals of the Bachelor of Science in Medical Biology is to leverage the rich population of prospective students in South Carolina to help meet the shortage in healthcare workers. The Association of American Medical Colleges has estimated that the United States could be short more than 120,000 physicians by 2030. The deficit will be most keenly felt in the South, which already has fewer doctors than other parts of the country. Every county in South Carolina is designated as medically underserved according to the state Department of Health and Environmental Control. Anderson, Pickens, Oconee, Laurens and Spartanburg counties are considered shortage areas for primary-care doctors. Despite several colleges in South Carolina offering Health Sciences programs, the overall lack of educational and training opportunities is acting as a bottleneck, stymieing the flow of students into the workforce as doctors and PAs.

Transfer and Articulation

Identify any special articulation agreements for the proposed program. Provide the articulation agreement or Memorandum of Agreement/Understanding.

Lander University abides by the intent and provisions of the State Policy on Transfer, available through the South Carolina Commission on Higher Education (SCCHE) and South Carolina Transfer and Articulation Center (SC TRAC). Lander University has already partnered with Piedmont Technical College (PTC) and Greenville Technical College (GTC) for the optimal transition of PTC and GTC graduates into Lander University. Once the Medical Biology program is approved by SCCHE and the Commission on Colleges of the Southern Association of Colleges and Schools, Lander University will work with these and other technical schools to streamline the process for technical school students to get into and complete

the program. Likewise, Lander University will work with the professional schools of the state on articulation agreements to ensure successful entrance into post-graduate programs.

Employment Opportunities

Medical Biology is a generic term used to describe several healthcare job titles and descriptions. As such, it is difficult to identify consistent job data that accurately depict the employability of the proposed graduates. Below are several different job titles that fall under the umbrella of Medical Biology and are the expected career paths of our graduates.

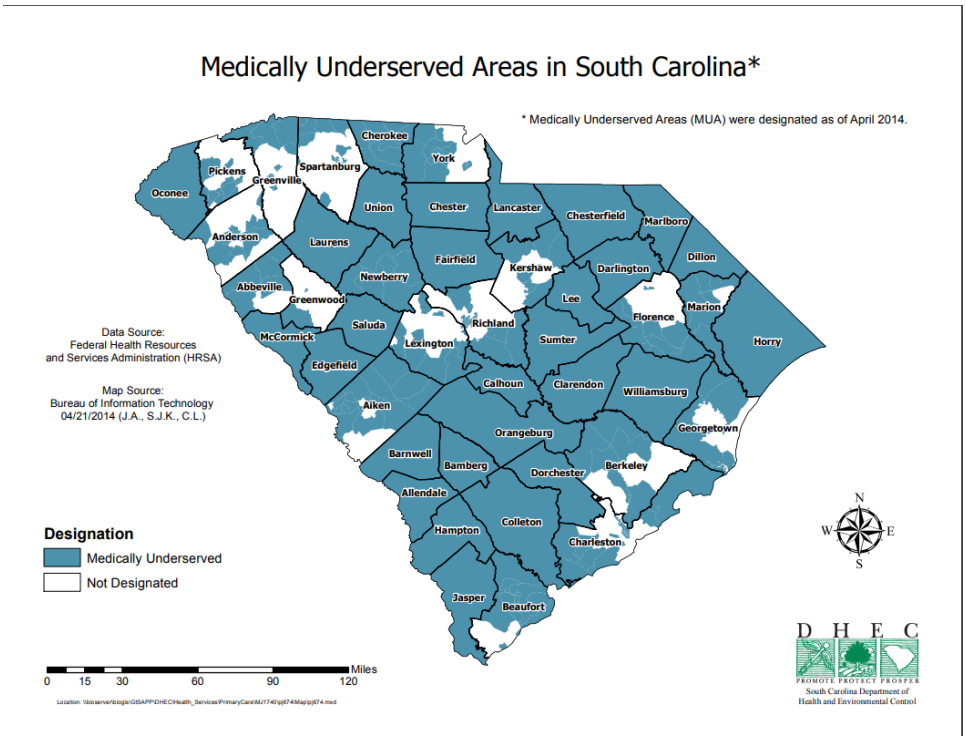
	State		National		
Occupation	**2020**	**Expected 2030**	**2020**	**Expected 2030**	**Data Type and source**
Clinical Laboratory Technologist and Technicians	4,150	4,606	335,500	372,405	Long term projections. From US Bureau of Labor Statistics. https://www.bls.gov/ooh/healthcare/home.htm
Genetics Counseling			2,400	3,024	
Medical Assistant	11,840	13,971	720,900	850,662	
Medical Records and Health Information Specialists	180	196	416,400	453,876	
Medical Transcriptionist	690	641	52,400	48,732	
Physicians and Surgeons	3310	3500	727,000	751,800	
Dentists	1610	1738	139,200	150,300	
Physical Therapists	2940	3560	239,200	288,300	
Physicians Associate	1530	2003	129,400	169,500	

For those students that complete the degree program and elect to not pursue a medical school route, employment opportunities will be similar to those of students completing the traditional biology program. These opportunities include, but are not limited to, becoming a biological technician, a biology teacher, an environmental scientist, a pharmacologist, and a nature conservation officer. In addition, the experience gained in the proposed program should make them more competitive for healthcare related employment, such as a laboratory technologist, medical assistant, health informational specialist, medical transcriptionist, health communications specialist, or a healthcare counselor.

Supporting Evidence of Anticipated Employment Opportunities

Provide supporting evidence of anticipated employment opportunities for graduates.

The COVID-19 pandemic has changed every known model in every industry, so any attempt to speculate a "new norm" is going to be difficult. However, even before 2020, demand for healthcare jobs was skyrocketing. Multiple sources have identified that due to the COVID-19 pandemic, healthcare-related jobs are in even higher demand (see Post and Courier below). Additionally, according to DHEC, all areas of South Carolina are medically underserved, meaning that our graduates will have many local jobs and opportunities in South Carolina.



The AAMC predicts a shortage of 122,000 physicians in the United States by 2032.
https://www.aamc.org/news-insights/press-releases/new-findings-confirm-predictions-physician-shortage

https://www.postandcourier.com/business/sc-needs-more-health-providers-but-there-arent-enough-spots-to-train-them/article_90c5381e-6526-11e9-8547-1f964d9bc85e.html

Description of the Program

Projected Enrollment			
Year	Fall Headcount	Spring Headcount	Summer Headcount
2022	10	10	N/A
2023	25	25	N/A
2024	40	40	N/A
2025	55	55	N/A
2026	60	60	N/A

Explain how the enrollment projections were calculated.
The enrollment projections are based on the popularity of health care related fields for freshmen entering college but limited by the academic requirements set forth by the program. To gauge the interest of college freshmen for a Medical Biology program, we surveyed our current Freshman class (n = 63) and found that 50% of them would be interested in hearing more information about a Medical Biology degree. To determine the number of students that would meet the program GPA requirements, we looked at historic data from our Biology program and found that 30% of the students would meet the requirements. Although this data is based on our current Biology program, the intent of the Medical Biology program is to attract new students to Lander University.

Besides the general institutional admission requirements, are there any separate or additional admission requirements for the proposed program? If yes, explain.

☒Yes

☐No

Because of the competitive nature of admittance into professional schools, the Medical Biology program will mirror similar standards expected for successful admission into most professional post-graduate programs. Freshmen entering the program do not have any additional admissions requirement beyond those of being admitted into Lander University. At the end of the freshman year, students must have a cumulative 3.25 GPA and have completed a minimum of 24 credit hours at Lander University. After the second year, students must maintain a 3.5 cumulative GPA, evaluated prior to each Fall semester, to remain in the program. Students that transfer to Lander University may enter the program at any stage as long as they meet the cumulative GPA requirement of their academic class.

Lander values student success, and students unable to continue in the program will be offered a pathway to complete an alternative degree, such as our traditional B.S. in Biology.

Curriculum

New Courses

List and provide course descriptions for new courses.

BIOM 195: Freshman Seminar in Medical Biology	This is the first course in a four-course series introducing students to careers in health care fields. The American health care system is introduced, and an explanation of the requirements to work in health care is discussed. Course work includes completion of a personal statement describing why students want to work in the health care field. Basic interview skills required for admission into professional school will also be presented. Prerequisites: Freshman status as a Medical Biology major. One credit hour.
BIOM 295: Sophomore Seminar in Medical Biology	This is the second course in a four-course series introducing students to careers in health care fields. Building on prior coursework, additional complexities of the American health care system will be examined. Best practices for submitting applications for entry into health care fields and interviewing skills will be practiced. Reading and interpreting clinical research and scientific primary literature will be introduced. Prerequisites: Sophomore status as a Medical Biology major; "C" or better in BIOM 195. One credit hour.
BIOM 395: Junior Seminar in Medical Biology	This is the third course in a four-course series introducing students to careers in health care fields. The specific requirements and skills necessary for the student's chosen field in health care will be identified and discussed. The skills necessary for communicating with people from diverse backgrounds and with researchers and medical professionals will be addressed, and the ethical principles of health care are introduced. Prerequisites: Junior status as a Medical Biology major; "C" or better in BIOM 295. One credit hour.
BIOM 499: Senior Capstone Seminar in Medical Biology	This is the final course in a four-course series designed to prepare students for careers in health care fields, and it will be taken during a student's final semester in the program. It will include an oral and written presentation of a faculty-approved, literature-based research topic in health care, which will represent a culmination of biological and communication skills. Prerequisites: Graduating semester status and "C" or better in BIOM 395. One credit hour.
BIOM 320: Biomedical Statistics	This course introduces concepts for the interpretation, evaluation, and communication of biomedical research and provides the framework to rigorously analyze data. The application of statistics to biomedical sciences, including clinical trials, epidemiology, and genomics is emphasized. Topics include biomedical study design, randomization, graphical data displays, control bias, variability, interactions, and ethics of human experimentation. Prerequisite: "C" or better in MATH 211. Three credit hours.
BIOM 321: Foundational Concepts for Admission to Medical School	This course reinforces the scientific reasoning and analytical skills necessary for successful admission to medical school. Students are required to take two practice MCAT exams, one near the beginning of the course and one near the end of the course, to evaluate their understanding of the foundational concepts. Because these exams take six to eight hours to complete, they are typically scheduled on a Saturday or Sunday. Prerequisites: "C" or better in CHEM 221 and PHYS 201 and permission of instructor. Three credit hours.

Total Credit Hours Required: 120

Curriculum by Year					
Course Name	**Credit Hours**	**Course Name**	**Credit Hours**	**Course Name**	**Credit Hours**
Year 1					
Fall		**Spring**		**Summer**	
Principles of Biology I (BIOL 111)	4	Principles of Biology II (BIOL 112)	4		
General Chemistry I (CHEM 111)	4	General Chemistry II (CHEM 112)	4		
Freshman Orientation (LINK 101)	1	Writing and Inquiry II (ENGL 102)	3		
Writing and Inquiry I (ENGL 101)	3	Intro to Statistics I (MATH 211)	3		
Math for Bus, Sci, and SS (MATH 121 or MATH 123)	3	Freshman Seminar in MB (BIOM 195)	1		
Total Semester Hours	15	Total Semester Hours	15	Total Semester Hours	
Year 2					
Fall		**Spring**		**Summer**	
Human Anatomy (BIOL 202)	4	Human Physiology (BIOL 203)	4		
Biomedical Statistics (BIOM 320)	3	Soph. Seminar in MB(BIOM 295)	1		
Organic Chemistry I (CHEM 221)	4	Elective	4		
Elective	1	Intro to Sociology (SOCI 101)	3		
Literature (ENGL 202)	3	History (HIST 101)	3		
Total Semester Hours	15	Total Semester Hours	15	Total Semester Hours	

Course Name	Credit Hours	Course Name	Credit Hours	Course Name	Credit Hours
Year 3					
Fall		**Spring**		**Summer**	
Pathophysiology (BIOL 304)	3	Biology Elective (BIOM or BIOL 3XX)	3		
Genetics (BIOL 312)	4	Cell Biology (BIOL 401)	4		
Junior Seminar in MB (BIOM 395)	1	Biochemistry (CHEM 301)	3		
Elective	4	Elective	4		
Intro to Psychology (PSYC 101)	3	Ethics (PHIL 302)	3		
Total Semester Hours	15	Total Semester Hours	17	Total Semester Hours	
Year 4					
Fall		**Spring**		**Summer**	
Microbiology (BIOL 204 or BIOL 421)	4	Senior Capstone (BIOM 499)	1		
Biology Elective (BIOM or BIOL 3XX)	4	Biology Elective (BIOM or BIOL 3XX)	4		
Elective	3	Biology Elective (BIOM or BIOL 3XX)	3		
Elective	3	Elective	3		
		Elective	3		
Total Semester Hours	14	Total Semester Hours	14	Total Semester Hours	

2022-2023 PROGRAM REQUIREMENTS

DEGREE: **BACHELOR OF SCIENCE**
MAJOR: **MEDICAL BIOLOGY**
EMPHASIS:

	Credit Hours
UNIVERSITY REQUIREMENT	
FALS 101: Fine Arts and Lecture Series	0
GENERAL EDUCATION REQUIREMENTS (For approved courses see the General Education: www.lander.edu/gen-ed.)	
A. Core Academic Skills (9 hours)	
ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
MATH 121: Math for Bus, Life Science	
or	
MATH 123: Calculus & its Applications	3
B. Humanities and Fine Arts (6 hours selected from 2 different disciplines)	6
C. Behavioral and Social Perspectives	6
PSYC 101: General Psychology	
And	
SOCI 101: Introduction to Sociology	
D. Scientific and Mathematical Reasoning	7
CHEM 111: General Chemistry I	
And	
MATH 211: Introduction to Statistical Methods I	
E. Founding Documents of the United States	3
HIST 111: United States History to 1877	
or	
POLS 101: American National Government	
F. World Cultures	3
G. LINK 101: Leadership, Involvement, Networking and Knowledge	1
TOTAL GENERAL EDUCATION REQUIREMENTS	35
MAJOR PROGRAM CORE REQUIREMENTS	
BIOL 111: Principles of Biology I	4
BIOL 112: Principles of Biology II	4
BIOM 195: Freshman Seminar in Medical Biology	1
BIOL 202: Human Anatomy	4
BIOL 203: Human Physiology	4
BIOL 204: Microbiology	4
BIOM 295: Sophomore Seminar in Medical Biology	1

BIOL 304: Pathophysiology	3
BIOL 312: Genetics	4
BIOM 320: Biomedical Statistics	3
BIOM 395: Junior Seminar in Medical Biology	1
BIOL 401: Cell Biology	4
BIOM 499: Senior Capstone Seminar in Medical Biology	1
CHEM 221: Organic Chemistry I	4
CHEM 301: Biochemistry	3
TOTAL MAJOR PROGRAM REQUIREMENTS	45
MAJOR PROGRAM ADDITIONAL REQUIREMENTS	
CHEM 112: General Chemistry II	4
MAJOR PROGRAM ELECTIVES	
BIOL or BIOM 300-level above	12
ADDITIONAL ELECTIVES	24
The remaining 12 hours may be 100-level or above	
TOTAL FOR BS DEGREE	120

See 4-year major guides for recommended order in which to take courses
https://www.lander.edu/academics/registrars-office/resources/major-guides

Similar Programs in South Carolina offered by Public and Independent Institutions
Identify the similar programs offered and describe the similarities and differences for each program.

There is no current B.S. program in Medical Biology offered in the State of South Carolina that targets students who desire a healthcare focused, pre-professional path at a small state university.

Program Name and Designation	Total Credit Hours	Institution	Similarities	Differences
B.S. of Health Sciences	120	Furman University	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students Similar core requirements: General Bio, 16 hours of Chem, Genetics, Cell Biology	Program offered at public educational institution instead of private educational institution.
B.S. in Biology	120	USC-Columbia	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students Similar core requirements: General Bio, 16 hours of Chem, Genetics, Cell Biology	This program includes a four-semester seminar series intentionally designed to expose students to concepts unique to students that want to work in health care and to provide access to experiences recommended or required for admittance to post-graduate professional school. Students pursuing careers in health care are all put into one learning community.
B.S. in Biology	120	Clemson University	Graduates will be prepared for a career in the healthcare industry.	This program includes a four-semester seminar series intentionally designed to expose students to concepts unique

			Targets pre-health professions students Similar core requirements: General Bio, 16 hours of Chem, Genetics, Cell Biology	to students that want to work in health care and to provide access to experiences recommended or required for admittance to post-graduate professional school. Students pursuing careers in health care are all put into one learning community.
B.S. in Biology	120	Francis Marion University	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar core requirements: General Bio, 16 hours of Chem, Genetics, Cell Biology, Physics	Lander's Medical Biology program would have a 45-credit hour core curriculum where the Francis Marion program has a core curriculum of 90 credit hours.
B.S in Biology	131-137	The Citadel	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar Core requirements: General Bio, Chem, Genetics, Cell Biology, Physics	This program does not yet have an accelerated entry (3 + 4) into MUSC like The Citadel, but will not have the ROTC requirements. Graduates from the Citadel have 5 biology elective course requirements, compared to Lander's Medical Biology program's 3 biology electives.
B.S in Biology B.S. in Biology, Molecular Concentration	120	The College of Charleston	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar Core requirements: General Bio, Chem, Genetics, Cell Biology, Physics	Students must complete a traditional biology degree program and take the prerequisite courses of the medical school, where the Lander program is tailored to those interested in healthcare fields and greatly reduces extra coursework.

B.S. in Biology	120	USC – Upstate	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar Core requirements: General Bio, Chem, Genetics, Cell Biology, Physics	Students must complete a traditional biology degree program and take the prerequisite courses of the medical school, where the Lander program is tailored to those interested in healthcare fields and greatly reduces extra coursework.
B.S. in Biology	120	Winthrop University	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar Core requirements: General Bio, Chem, Genetics, Cell Biology, Physics	The Winthrop pre-professional biology programs require the completion of 63-64 credit hours in the core major curriculum. Lander's Medical Biology program would have a 45 credit hour core curriculum.
B.S. in Biology	120	Anderson University	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar Core requirements: General Bio, Chem, Genetics, Cell Biology, Physics	Students must complete a traditional biology degree program and take the prerequisite courses of the medical school, where the Lander program is tailored to those interested in healthcare fields and greatly reduces extra coursework.
B.S. in Biology	120	Columbia College	Graduates will be prepared for a career in the healthcare industry. Targets pre-health professions students. Similar Core requirements: General Bio, Chem, Genetics, Cell Biology, Physics	The Columbia College pre-Med track in the biology major program require the completion of 73 credit hours in the core major curriculum. Lander's Medical Biology program would have a 45 credit hour core curriculum.

Faculty

Rank and Full- or Part-time	Courses Taught for the Program	Academic Degrees and Coursework Relevant to Courses Taught, Including Institution and Major	Other Qualifications and Relevant Professional Experience (e.g., licensures, certifications, years in industry, etc.)
Professor	BIOL 111, BIOL 202, BIOM 499	Ph.D. Anatomy	15 years of teaching experience
Assistant Professor	BIOL 112, BIOM 195, BIOL 202, and BIOL 204/421	Ph.D. Microbiology	8 years of teaching experience
Professor	BIOL 203, BIOM 295, BIOL 304 and BIOM 320	Ph.D. Reproductive Physiology	20 years of teaching experience
Professor	BIOL 202, BIOM 395, and BIOL 401	Ph.D. Molecular Genetics	20 years of teaching experience
Professor	BIOL 312	Ph.D. Genetics	18 years of teaching experience
Professor	CHEM 221	Ph.D. Chemistry	18 years of teaching experience
Assistant Professor	CHEM 301	Ph.D. Chemistry	3 years of teaching experience

Total FTE needed to support the proposed program: 7 existing; 0 new
Faculty: 7 existing; 0 new
Staff: 1 existing; 0 new
Administration: 1 existing, 0 new

Faculty, Staff, and Administrative Personnel
Discuss the Faculty, Staff, and Administrative Personnel needs of the program.

The B.S. in Medical Biology degree program will require no new faculty lines of support and will utilize existing faculty across the university to support the launch and early development of the program. All faculty members in the Biology Department hold the appropriate degrees and are qualified to teach undergraduate courses. However, it is reasonable to expect that as enrollment increases so will the demand for new class sections. If enrollment growth exceeds the proposed five-year plan, new line(s) will be required to support the degree program commensurate with Lander's policy of student to faculty ratio.

Existing administration and staff will be utilized for this program as well and their workload will be split between two programs in the department.

Resources

Library and Learning Resources
Explain how current library/learning collections, databases, resources, and services specific to the discipline, including those provided by PASCAL, can support the proposed program. Identify additional library resources needed.

Lander University library services currently subscribes to a variety of online and print resources that support the Department of Biology, and the degree program: BS in Medical Biology
In addition to the full-text multidisciplinary database *Academic Search Complete* library database holdings include:

Applied Science and Technology with full-text: includes indexing and abstracts for English-language scientific and technical publications dating back to 1983. Also included are full-text articles dating back to 1990 and page images that provide access to original illustrations, charts and photographs. There are more than 115 active full-text journals and magazines covering subjects such as atmospheric science, engineering and biomedical materials, energy resources and research, geology, industrial engineering, mathematics, mechanical engineering, nuclear engineering, petroleum and gas, physics, space science, textile industry and fabrics.

Biological Science Collection: Includes the renowned Biological Sciences, MEDLINE, and TOXLINE databases and provides full-text titles from around the world, including scholarly journals, trade and industry journals, magazines, technical reports, conference proceedings, and government publications covering cutting edge research topics from medicine, technology and the environment.

Consumer Health Complete: covers key areas of health and wellness, from mainstream medicine to the many perspectives of complementary, holistic, and integrated medicine. It also provides access to up-to-date, concise, and clinically relevant drug monographs.

General Science full-text: includes full text for nearly 100 periodicals dating back to 1994 and indexing and abstracts for nearly 300 periodicals dating back to 1984. Subject coverage includes biology, botany, conservation, environment, genetics, and zoology.

Global Issues in Context: covers an array of materials pertaining to biological sciences (over 100 major topics). This database provides full text articles and multimedia updated daily from more than 660 geographically diverse newspapers, magazines, and journals for a truly global view.

Medline with full-text: provides full-text for more than 1,400 of the most-used biomedical and health journals with cover-to-cover indexing that date back to 1936.

Nature: International Journal of Science Archives (1950 – 2011): a weekly international journal publishing the finest peer-reviewed research in all fields of science and technology on the basis of its originality, importance, interdisciplinary interest, timeliness, accessibility, elegance and surprising conclusions. We have archival access from 1950 – 2011.

Open Dissertations (EBSCOhost): American Doctoral Dissertations, 1933-1955 is a free database providing access to the only comprehensive record of dissertations accepted by American universities during that time period, the print index Doctoral Dissertations Accepted by American Universities. Containing nearly 100,000 citations, American Doctoral Dissertations, 1933-1955, provides full page images of the original print index, and may be searched by author, title, subject and university.

Opposing Viewpoints in Context: covers an array of viewpoints pertaining to health and medicine (over 100 major topics).

PubMED: comprises more than 26 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

Gale in Context: Science: By integrating authoritative, curriculum-aligned reference content with headlines and videos, *this resource shows* students how scientific disciplines relate to real-world issues. Content includes full-text articles from national and global newspapers, magazines, and journals. Additionally, experiments and projects from *U*X*L Experiment Central* provide practical experience.

Science Reference Center: an excellent source of reliable information on life sciences, physical sciences, mathematics, and technology. Full-text coverage is available for more than 200 science periodicals including: *Popular Science***,** *New Scientist* and *Discover.*

Scientific American Archives (1948 – 2011): This is the award-winning authoritative source for the science discoveries and technology innovations that matter. We have archival access from 1948 – 2011.

Stat!Ref: A healthcare e-resource, includes Stedman's Medical Dictionary, AAFP Conditions A to Z, and MedCalc 3000, which offers 400+ medical calculators.

3D Human Anatomy & Physiology: an engaging and effective web-based interactive 3D anatomy resource for both teachers and students, with 20 interactive modules covering each body system with accurate and interactive 3D anatomy and media rich physiology content that is brings this complex subject to life.

Book and film collections: Lander University library services have two databases of electronic books hosted through EBSCO and ProQuest. ProQuest's *eBook Central,* contains 19,048 titles relating to Health and Medicine and EBSCO's ebook collection contains 2,553 titles relating to Health and Medicine. Additionally, the print holdings of the library contain 4,755 titles on this subject. The library also subscribes to a database of documentary films called *Films on Demand,* which contains 8175 films on the topics of medical biology and health and medicine.

Newspaper and Popular Magazine resources: Library services offers a variety of online newspaper resources that could be useful to students of biology. The library has purchased campus-wide access to *The New York Times*. The library offers a full-text digital collection of 1,200 newspapers from the database *Newspaper Source Plus*. Library Services provides a variety of popular magazines like *Men's and Women's Health* and *Prevention* in a digital magazine newsstand*, Flipster.*

Student Support Services
Explain how current academic support services will support the proposed program. Identify new services needed and provide any estimated costs associated with these services.

Lander University provides a comprehensive collection of resources to support student academic success. For example, the Information Technology Services (ITS) office provides students access to the Microsoft Student Advantage program (Office 365 ProPlus) and comprehensive technology support through the Technology Resource Assistance Center for Students (TRACS). All classes are taught using

the Blackboard Learning Management system, which provides a rich array of tools for content delivery and secure student assessment. Additional support services for students are provided by and/or coordinated through the Academic Success Center (ASC). For example, free tutoring sessions are routinely offered for many freshman and sophomore classes, and students may request assistance with locating tutors for individual courses without existing tutors. Research support is offered by the Jackson Library Resource collection and librarian consultation and composition support is offered by the Writing Lab. Academic advising is provided to students by both professional advisors in the ASC and departmental faculty. In addition, Lander requires all freshmen to complete LINK 101, which provides students with the knowledge base and skills critical for college success. Topics covered in LINK 101 include campus resources, student conduct and honor code, academic success, student health, career exploration, financial wellness, and special topics developed according to each student's major or needs.

No additional services are anticipated at this time.

Physical Resources/Facilities
Identify the physical facilities needed to support the program and the institution's plan for meeting the requirements.

Lander will utilize existing spaces on the university's main campus. Most of the courses in this program are already being offered so no new facilities are needed.

Equipment
Identify new instructional equipment needed for the proposed program.

No new instructional equipment is needed for this program since most of the required courses are already being offered and there is room to accommodate the expected new enrollment. However, there will be an additional cost for each additional students related to the chemicals, supplies, materials, and software used in the classes and laboratories. These costs are offset by laboratory fees associated with certain courses, as indicated in the section below regarding program specific fees.

Impact on Existing Programs
Will the proposed program impact existing degree programs or services at the institution (e.g., course offerings or enrollment)? If yes, explain.

☒Yes

☐No

Currently, Lander University offers a traditional Bachelor of Science in Biology that has a rich history of preparing graduates to enter the workforce as well as gain entrance to graduate and professional post-graduate programs. Because of the history and popularity of our existing program, we believe there will only be minor enrollment impacts on the existing Biology program. The goal of the Medical Biology program is to attract new incoming freshmen and transfer students who desire a more career focused curriculum and unique opportunities to experience hands-on patient care in clinical settings to help them gain a better understanding of the day-to-day demands of a healthcare career.

Financial Support

Sources of Financing for the Program by Year												
	1st		2nd		3rd		4th		5th		Grand Total	
Category	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**
Tuition Funding	$117,000	$117,000	$292,500	$292,500	$468,000	$468,000	$643,500	$643,500	$702,000	$702,000	$2,223,000	$2,223,000
Program-Specific Fees	$1,850	$1,850	$3,975	$3,975	$4,575	$4,575	$4,975	$4,975	$5,175	$5,175	$20,550	$20,550
Special State Appropriation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Reallocation of Existing Funds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Federal, Grant, or Other Funding	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$118,850	$118,850	$296,475	$296,475	$472,575	$472,575	$648,475	$648,475	$707,175	$707,175	$2,243,550	$2,243,550
Estimated Costs Associated with Implementing the Program by Year												
	1st		2nd		3rd		4th		5th		Grand Total	
Category	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**	**New**	**Total**
Program Administration and Faculty/Staff Salaries	$16,250	$16,250	$16,250	$16,250	$16,250	$16,250	$16,250	$16,250	$16,250	$16,250	$81,250	$81,250
Facilities, Equipment, Supplies, and Materials	$1,480	$1,480	$3,180	$3,180	$3,660	$3,660	$3,980	$3,980	$4,140	$4,140	$16,440	$16,440
Library Resources	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other (specify)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$17,730	$17,730	$19,430	$19,430	$19,910	$19,910	$20,230	$20,230	$20,390	$20,390	$97,690	$97,690
Net Total (Sources of Financing Minus Estimated Costs)	$101,120	$101,120	$277,045	$277,045	$452,665	$452,665	$628,245	$628,245	$686,785	$686,785	$2,145,860	$2,145,860

Note: New costs - costs incurred solely as a result of implementing this program. Total costs - new costs; program's share of costs of existing resources used to support the program; and any other costs redirected to the program.

Budget Justification

Provide an explanation for all costs and sources of financing identified in the Financial Support table. Include an analysis of cost-effectiveness and return on investment and address any impacts to tuition, other programs, services, facilities, and the institution overall.

Tuition Funding

The tuition generated in the table above is based on projected enrollment in the program at the current tuition rate for full-time students ($5850/semester). We are anticipating 10 new students the first year, and then 15 each year after that. Our numbers assume no students migrate from a biology major to this program. This could happen, but we cannot predict the intentions of current students.

Program Specific Fees

Some courses required in this curriculum have associated lab fees. BIOL 111, BIOL 112, BIOL 202, BIOL 203, BIOL 204, CHEM 111, CHEM 112, and CHEM 221 each have a lab fee of $40, and MATH 211 has a fee of $25. We have used the four year guide of classes to estimate how many students from this program will be in courses with lab fees, and used the current fee to predict the total amount to be collected. As an example, for the first year this is based on 10 students taking BIOL 111-112, CHEM 111-112, and MATH 211. For the second year, this is based upon 15 students taking these courses, and then 10 students taking BIOL 202-203 and CHEM 221.

Program Administration and Faculty salaries

The only costs expected in the first five years are the costs to teach ten hours of new coursework. These courses will be taught by existing full-time faculty members. A percentage of full-time faculty pay is used to show this estimated cost. The other courses in the major are already being offering and seats are available to accommodate the number of students expected.

Facilities, Equipment, Supplies, and Materials

We used an estimate of the cost per student in each of the courses that collect a lab fee to predict the cost for the students in this program being enrolled in the course. This is not new equipment purchases, but covers the cost of chemicals, supplies, materials, and software used in these courses. Again, this expense varies year to year because of the different number of students in these courses. This expense is 80% of the fees received in the top portion of the table, as 20% is put in reserves for when we need new equipment or repairs.

Evaluation and Assessment

Explain how the proposed program, including all program objectives, will be evaluated, along with plans to track employment. Describe how assessment data will be used.

Goal 1	Objective	Criteria/Competency/Traits	Where Introduced	Where Assessed	Assessment Method

Lander MB graduates will be successful at gaining admission to professional post-graduate programs.	A. Students will have a complete understanding the processes involved in gaining admission to professional school.	1. Students will write thoughtful entrance essays when applying for professional school that are intentionally written to address admittance criteria specific to the program. 2. Students will understand the best practices of interviewing for a professional program.	BIOM 195 BIOM 295 BIOM 395	BIOM 495	Course assignment Rubrics
	B. Students will be accepted to professional programs.	Students will be qualified to be admitted to the professional programs.	BIOM 195 BIOM 295 BIOM 395	BIOM 495	Portfolio Review Rubric

Goal 2	Objective	Criteria/Competency/Traits	Where Introduced	Where Assessed	Assessment Method
Lander MB graduates will demonstrate an understanding of primary pillars of knowledge recommended by the Nation Science Foundation in their "Vision of Change: A call to action for Undergraduate Biology Programs" and the Howard Hughes Medical Institute for what "Scientific Foundation for Future Physicians" should know.	A. Students will understand the structure and function relationships of the natural world.	1. Physiological functions are often compartmentalized into different cells, tissues, organs, and systems, which have structures that support specialized activities 2. The size, shape, and physical properties of organs and organisms all affect function. The ratio of surface area to volume is particularly critical for structures that function in transport or exchange of materials and heat 3. Structure constrains function in physiology; specialization for one function may limit a structure's ability to perform another function.	BIOL 112 BIOL 202 BIOL 203 BIOL 204 BIOL 401 CHEM 301	Qualifying Exam (BIOM 295)	Exam score > 50% on selected responses
				MFT Exam (BIOM 499)	Exam score > 50% on selected responses
				BIOL 401	Assignment rubric
	B. Students will understand how information flow and exchange happens in biological systems.	1. Information stored in DNA is expressed as RNA and proteins. These gene products impact anatomical structures and physiological function. 2. Organisms have sophisticated mechanisms for sensing changes in the internal or external environment. They use chemical, electrical, or other forms of signaling to coordinate responses at the cellular, tissue, organ, and/or system level.	BIOL 111 BIOL 112 BIOL 203 BIOL 312 BIOL 401	Qualifying Exam (BIOM 295)	Exam Score > 50% on selected responses
				MFT Exam (BIOM 499)	Exam Score > 50% on selected responses
				BIOL 312	Assignment Rubric
	C. Students will understand the pathways and transformations of energy and matter	1. Energy captured by primary producers is stored as chemical energy. This stored energy can be converted through a series of biochemical reactions into ATP for immediate use in the cell. 2. In cells, the synthesis and breakdown of molecules is highly regulated. Biochemical pathways usually involve multiple reactions catalyzed by enzymes that lower activation energies. Energetically unfavorable reactions are driven by coupling to energetically favorable reactions such as ATP hydrolysis. 3. Intracellular and intercellular movement of molecules occurs via 1) energy-demanding transport processes and 2) random motion. A molecule's movement is affected by its thermal energy, size, electrochemical gradient, and biochemical properties.	BIOL 112 BIOL 203 BIOL 204 BIOL 304 BIOL 401 CHEM 301	Qualifying Exam (BIOM 295)	Exam Score > 50% on selected responses
				MFT Exam (BIOM 499)	Exam Score > 50% on selected responses
				CHEM 301	Assignment rubric
	D. Students will understand the interconnectedness within and	1. Organ systems are not isolated, but interact with each other through chemical and physical signals at the level of cells, tissues, and organs.	BIOL 111 BIOL 112 BIOL 203 BIOL 204 BIOL 304	Qualifying Exam (BIOM 295)	Exam Score > 50% on selected responses
				MFT Exam (BIOM 499)	Exam Score > 50% on selected responses

	among living systems	2. An individual's physiological traits affect its interactions with other organisms and with its physical environment. 3. In the face of environmental changes, organisms may maintain homeostasis through control mechanisms that often use negative feedback; others have adaptations that allow them to acclimate to environmental variation.	BIOL 401	BIOL 304	Assignment rubric

Goal 3	Objective	Criteria/Competency/Traits	Where Introduced	Where Assessed	Assessment Method
Lander MB graduates will have the ability to use quantitative reasoning	Students will be able to apply appropriate quantitative reasoning, models, and simulations to interpret biological data.	1. Developing and interpreting graphs. 2. Applying statistical methods to diverse data Mathematical modeling. 3. Managing and analyzing large data sets.	BIOL 111 BIOL 112 BIOL 203 BIOL 320 BIOL 401	Qualifying Exam (BIOM 295)	Exam Score > 50% on selected responses
				MFT Exam (BIOM 499)	Exam Score > 50% on selected responses
				BIOL 320	Assignment rubric

Goal 4	Objective	Criteria/Competency/Traits	Where Introduced	Where Assessed	Assessment Method
Lander MB graduates will have the ability to apply the process of science.	Students will be able to design scientific process to understand living systems	1. Observational strategies 2. Hypothesis testing 3. Experimental design 4. Evaluation of experimental evidence 5. Developing problem-solving strategies	BIOL 111 BIOL 112 BIOL 320 BIOL 401	MFT Exam (BIOM 499)	Exam Score > 50% on selected responses
				BIOL 320	Assignment rubric

Goal 5	Objective	Criteria/Competency/Traits	Where Introduced	Where Assessed	Assessment Method
Lander MB graduates will be able to accurately and effectively communicate and collaborate within the discipline of biology and with other disciplines	Students will be able to communicate biological concepts and interpretations to scientists in other disciplines	1. Scientific writing 2. Explaining scientific concepts to different audiences	BIOM 195 BIOM 295 BIOM 395 BIOL 401	BIOM 495	Assignment rubric
				BIOL 401	Presentation rubric

Assessment of the program objectives will be accomplished by:

- Successful completion of required classes as the student progresses through the program.
- Students will submit a portfolio to a review panel that will use a robust assessment rubric. The data collected from these rubrics will be evaluated annually to identify strengths and areas for improvement.
- A portfolio exit presentation will be required of each student to identify their strengths and weakness in their application for a post-graduate program.
- Communication with graduates will be maintained through social media as well as collaboration with the Office of Alumni Affairs.
- At the end of each academic year, the faculty will share the results of assessment and identify ways to improve student performance. Possible steps for improvement could take the form of class modality modification, assignment changes, emphasis on specific topics, or changes to student feedback.
- When needed, the faculty will review learning outcomes and the methods of assessment.

Lander University maintains a comprehensive annual assessment system for the evaluation and continuous improvement of all academic programs and administrative units. Consistent with this program, the B.S. in Medical Biology program will be assessed annually by Biology faculty. A faculty member will serve as the program assessment coordinator and other faculty will be involved in collecting and reviewing a variety of data. Student learning outcomes data acquired in the Assessment Method column of the table above demonstrates the effectiveness of instruction in the curriculum by measuring the student attainment of learning. Program productivity data, including FTE enrollments and graduation rates, will be monitored to determine continuing need for the program and the long-term sustainability of the program.

In addition, Lander University conducts regular alumni surveys to track employment status of alumni. This alumni survey data will be combined with additional data collected by faculty in the Department of Biology to track alumni employment.

Accreditation and Licensure/Certification

Will the institution seek program-specific accreditation (e.g., CAEP, ABET, NASM, etc.)? If yes, describe the institution's plans to seek accreditation, including the expected timeline.

☐Yes

☒No

Will the proposed program lead to licensure or certification? If yes, identify the licensure or certification.

☐Yes

☒No

Explain how the program will prepare students for this licensure or certification.

If the program is an Educator Preparation Program, does the proposed certification area require national recognition from a Specialized Professional Association (SPA)? If yes, describe the institution's plans to seek national recognition, including the expected timeline.

☐Yes

☒No