



June 13, 2025

Dr. Kevin Sightler
Substantive Change Office
SACS Commission on Colleges
1866 Southern Lane
Decatur, GA 30033

Re: New Program Approval – Undergraduate Certificate in Bioinformatics

Dear Kevin,

The University of Tennessee, Knoxville's faculty in the College of Emerging and Collaborative Studies propose to offer a 12-credit undergraduate certificate in Bioinformatics. The program will be offered beginning August 18, 2025.

The undergraduate certificate in Bioinformatics will be available as an in-person or online, "add-on" credential to students already enrolled and pursuing a degree at the institution or as a "stand-alone" credential for those enrolled elsewhere or who have completed a baccalaureate program elsewhere.

This new certificate program will feature more than 50% new coursework and current faculty members will teach the program. Library and learning resources and facilities are more than sufficient to support students in the program, as described in the prospectus.

Should you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Heather Hartman
SACSCOC Liaison

Cc: Donde Plowman, Chancellor
John Zomchick, Provost and Senior Vice Chancellor
Beth Avery Foster, Vice Provost for Academic Affairs
Ozlem Kilic, Dean, College of Emerging and Collaborative Studies

Office of Institutional Effectiveness
5723 Middlebrook Pike, Suite 218, Knoxville, TN 37921
865-974-6964 IEDept@utk.edu ie.utk.edu

1. Provide Common Content A – Background and Context, relative to the proposed change.

1. A list of programs offered by the institution (excerpt from the catalog or a printout of a webpage is acceptable).

The University of Tennessee, Knoxville (UT Knoxville) is authorized to offer undergraduate, masters, educational specialist, and doctoral degrees. The College of Emerging and Collaborative Studies (CECS) currently offers:

- Bachelor of Science in Applied Artificial Intelligence
- Bachelor of Science in Data Science
- Bachelor of Science in Innovative Transdisciplinary Studies
- Undergraduate certificate programs in:
 - Applied Artificial Intelligence
 - Applied Cybersecurity
 - Artificial Intelligence and Medicine
 - Artificial Intelligence Integration in Music
 - Data Science
 - Game Craft
 - Literacy on Emerging Topics
 - Sustainable Development
- Graduate certificate program in Applied Cybersecurity

The catalog excerpt for programs offered by CECS can be found in Appendix A.

2. Abstract (one page maximum)

a. Briefly describe the proposed change to include the intended implementation date.

The proposed change is to add a new undergraduate certificate in Bioinformatics. This certificate will require 12 credit hours of coursework and will be available as an “add-on” credential to students already enrolled and pursuing a degree at the University of Tennessee, Knoxville, or as a “stand-alone” credential to those who are enrolled elsewhere or who have already completed a bachelor’s degree at another institution.

b. Provide projected number of students, if applicable.

The undergraduate certificate in Bioinformatics program is anticipated to serve 15-20 students per academic year.

c. Indicate the projected life of the change, as applicable: one-time/limited duration or ongoing).

The undergraduate certificate in Bioinformatics will be an ongoing program starting fall 2025, that will continue to be offered in subsequent years. Courses will be offered every fall and spring semester.

d. Describe the primary target audience or market.

The primary audience for the undergraduate certificate in Bioinformatics includes students interested in enhancing their skills in working with biological datasets and in computational biology, pre-med students, students in mathematics and statistics who want to apply their methods to biological data and genomics. Current UT Knoxville undergraduate students, including College of Emerging and Collaborative Studies (CECS) majors, and some community members, are included in the market.

e. Describe the strengths of the institution to undertake the change.

CECS brings together campus expertise to develop cutting-edge curriculum and provide learners from all colleges with access to emerging technology and in-demand skills, serving as a hub for collaboration.

CECS faculty and staff work closely with industry partners from a variety of sectors to provide all learners with real-world, hands-on learning experiences through internships, capstone projects, and research opportunities. By combining classroom expertise with experiential learning, CECS equips students with the practical skills, industry knowledge, and professional networks necessary to meet the evolving demands of the modern workforce.

3. Describe how the need for the change was determined and how the change was approved by the institution.

The undergraduate certificate in Bioinformatics program is a strategic response to both regional and institutional workforce needs in Tennessee. This program offers interdisciplinary training in computer science, biological sciences, mathematics, aiming to equip students with the skills necessary to meet the growing demands of the bioinformatics field. Bioinformatics plays a crucial role in analyzing and interpreting complex biological data, which is essential for advancements in healthcare, agriculture, and environmental science. By offering this certificate, CECS addresses the need for professionals who can bridge the gap between data science and biological research. This initiative aligns with the state's broader commitment to enhancing workforce development in high-demand sectors. Moreover, the program complements existing bioinformatics offerings within the state, such as the University of Memphis's graduate certificate in Bioinformatics, which provides training in genomics, statistics, and computer science. By diversifying and expanding bioinformatics education options, CECS contributes to a well-rounded and robust workforce capable of meeting the evolving challenges in various scientific and technological fields.

The undergraduate certificate in Bioinformatics was approved following CECS processes for curriculum development, which includes convening an intercollegiate curriculum committee of faculty experts from across campus. The committee discussed, developed, and voted on the program name, content, courses, and learning objectives. Once the committee approved the certificate, CECS followed normal curricular procedures, including review and approval by the faculty and administrators and faculty at CECS and submission to the institution's undergraduate curriculum committee, undergraduate council, and faculty senate for review and approval.

Undergraduate certificate programs do not require the approval of an institutional governing board. The undergraduate certificate in Bioinformatics program was approved following the institution's curricular procedures, including review and approval by the faculty in CECS, and submission to the institution's undergraduate curriculum committee, Undergraduate Council, and Faculty Senate for review and approval. Minutes from the curriculum committee, Undergraduate Council, and Faculty Senate meetings reflecting final internal approval are found in Appendix B.

4. Describe how the change is consistent with the mission and goals of the institution.

The mission of UT Knoxville is “We are a diverse community with a shared commitment to discovery, creativity, learning, and engagement. At UT Knoxville we:

- **Empower** learners of all ages and backgrounds to achieve their dreams through accessible and affordable education and state-of-the-art research training opportunities.
- **Advance** the prosperity, well-being, and vitality of communities across Tennessee and around the world through our research, teaching, service, and engagement.
- **Commit** to excellence, equity, and inclusion within the university, across the state, and in all our global activities.”

The undergraduate certificate in Bioinformatics program allows UT Knoxville to educate learners through state-of-the-art research training opportunities and curriculum. It is anticipated that the availability of this certificate will also lead to increased accessibility and thereby enrollment in undergraduate education.

5. Provide documentation of faculty involvement in the planning and approval of the change.

Planning for the undergraduate certificate in Bioinformatics program involved interdisciplinary faculty from the Tickle College of Engineering, the Bredesen Center, the College of Arts and Sciences, the College of Emerging and Collaborative Studies, the Herbert College of Agriculture, and the University of Tennessee Libraries. Committee members met four times, between September and November 2024 to design the program. Members of the planning committee are included in the table below.

Name	College
Brynn Voy	Bredesen Center
Emily Chase	College of Arts and Sciences
Jianbin Wang	College of Arts and Sciences
Duc Nguyen	College of Arts and Sciences
Stephanie Kivlin	College of Arts and Sciences
Shahla Ray	College of Arts and Sciences
Vandana Singh	Emerging and Collaborative Studies
John Stier	Herbert College of Agriculture
Scott Lenaghan	Herbert College of Agriculture
Bonnie Ownley	Herbert College of Agriculture
Dewayne Shoemaker	Herbert College of Agriculture
Scott Emrich	Tickle College of Engineering
Steven Abel	Tickle College of Engineering
Donna Braquet	UT Libraries
Jeanine Fletcher	UT Libraries

Documentation of faculty involvement in planning is provided in Appendix C.

6. Provide evidence of legal authority for the change if approval is required by the governing board or the state.

Approval by the Tennessee Higher Education Commission (THEC) is not required for certificate programs. THEC requires a notification for certificates to be sent by the Chief Academic Office (i.e., Provost). The notification form for the undergraduate certificate in Bioinformatics program was submitted April 23, 2025 (Appendix D).

2. Provide the curriculum for the program.

Required course (6 credits):

- BINF 201 Introduction to Bioinformatics | 3 credits

Select one of the following courses (3 credits):

- BINF 202 Bioinformatics Programming | 3 credits
- COSC 111 Computational Thinking and the Art of Programming | 3 credits

Select two of the following courses (6 credits):

- BCMB 412 Molecular Biology and Genomics | 3 credits
- BCMB 422 Computational Biology and Bioinformatics | 3 credits
- BSE 464 Data Analytics in Agricultural and Ecological Systems | 3 credits
- COSC 420 Biologically Inspired Computation | 3 credits
- EEB 403 The Evolution of Cancer: An Integrative Approach | 3 credits
- EEB 406 Models in Biology | 3 credits

- EEB 411 Biostatistics | 3 credits
- MICR 411 Microbial Genetics | 3 credits
- MICR 470 Microbial Ecology | 3 credits
- MICR 479 Advanced Techniques in Nucleic Acid Sequencing | 3 credits
- MICR 480 Genomics and Bioinformatics | 3 credits

The undergraduate certificate in Bioinformatics program is intended to equip students with bioinformatics knowledge and skills necessary in a range of settings, including post-graduate studies and work in industry, research institutions, and some government agencies. The program is designed to accommodate and support students with diverse backgrounds, including those with limited initial programming experience. By completing the two core bioinformatics courses, students will develop foundational computational skills. Subsequent upper-level electives are designed to develop additional relevant skills in math, computing, statistics and/or biology that will help enable success post-graduation. For students who already have a strong background in one disciplinary area and wish to continue to prioritize, greater computational skills will allow pursuit of more advanced coursework in that desired area. At completion, students will be able to identify important problems in bioinformatics and to develop relevant solutions.

3. Provide a projected schedule of course offerings for the program.

The projected schedule of course offerings for the undergraduate certificate in Bioinformatics program is as follows:

- Fall 2025: *(and each subsequent fall)*

BCMB 422	COSC 111	MICR 411	MICR 479
BINF 201	EEB 411	MICR 470	MICR 480
- Spring 2026: *(and each subsequent spring)*

BCMB 412	BSE 464	COSC 420	EEB 406
BINF 202	COSC 111	EEB 403	EEB 411
			MICR 48
- Summer 2026: *(and each subsequent spring)*

COSC 111			
----------	--	--	--

4. Provide program-specific goals (objectives) and specific student learning outcomes for the program.

The undergraduate certificate in Bioinformatics program aims to bridge the skills gap, enhance career readiness, and contribute to the state's economic development by producing graduates equipped with relevant and up-to-date technological competencies. This program is designed to meet the occupational needs of local businesses and industries by offering technical training in computer operations. It covers essential areas such as programming languages ensuring that students are well-prepared for the evolving demands of the tech industry.

Learning outcomes for the undergraduate certificate in Bioinformatics program are as follows. Students will:

1. Use relevant computational skills to solve problems in bioinformatics.
2. Develop additional skills in math, statistics and/or biology that enable success in the field of bioinformatics by taking specific upper-level electives that complement existing College of Emerging and Collaborative Studies degrees.
3. Use analytical skills to identify important problems in bioinformatics and to identify solutions.

5. Describe how the student learning outcomes for the program will be assessed.

The table below illustrates the assessment plan for the undergraduate certificate in Bioinformatics program. Assignments from select courses will be assessed using rubrics developed by faculty members.

Program SLO	Course Where Outcome is Assessed	Assessment Method
1. Use relevant computational skills to solve problems in bioinformatics	BINF 201 BINF 202	Assignments and Quizzes
2. Develop additional skills in math, statistics and/or biology that enable success in the field of bioinformatics by taking specific upper-level electives that complement existing College of Emerging and Collaborative Studies degrees	BINF 201 BINF 202	Assignments and Quizzes
3. Use analytical skills to identify important problems in bioinformatics and identify solutions	BINF 201 BINF 202	Assignments and Quizzes

6. Provide course descriptions for all courses in the proposed program. Do not provide syllabi or catalogs (though course description excerpts from a catalog are acceptable).

BCMB 412 Molecular Biology and Genomics

(3 credit hours)

Nucleic acid structure and DNA technology. Mechanisms of cell division, replication, transcription, translation, splicing, recombination, DNA repair and transposition, chromosome organization, DNA-protein interaction in gene regulation, genomic imprinting, epigenetics, RNA interference, and genome evolution. *Prerequisite:* BIOL 240. *Comment(s):* Intended for biology majors in biochemistry and cellular and molecular biology concentration but also open to biology majors in other concentrations. This course satisfies BCMB 402 requirement for biology majors in the biochemistry and cellular and molecular biology concentration.

BCMB 422 Computational Biology and Bioinformatics

(3 credit hours)

An introduction to the cutting-edge tools and approaches biologists and clinicians use to extract information from the vast amounts of genomic and proteomic data becoming available. Students gain hands-on experience with computational biology tools such as data mining, protein structure manipulation and prediction, interaction network analysis, DNA sequence analysis, gene function analysis, R studio for statistics and data visualization, and dimensionality reduction for large datasets. Students apply these tools to biomedical research questions in course projects. *Satisfies Volunteer Core Requirement: (EI). Contact Hour Distribution: 2 hours lecture and 2 hours lab. Recommended Background: BIOL 240; BCMB 412. Comment: Helpful if students have taken or are taking BCMB 412 but not necessary. Registration Restriction: Minimum student level – junior. Registration Permission: Consent of instructor.*

BINF 201 Introduction to Bioinformatics

(3 credit hours)

This course will explore topics in the field of bioinformatics including tools and resources used by the discipline. Students will also be given hands-on experience with different computational frameworks, e.g., Web-based tools/databases used on student laptops, version control (Git), to command line/Unix. Open to all; no prior programming or Unix experience required.

BINF 202 Bioinformatics Programming

(3 credit hours)

This course focuses on developing problem-solving skills (e.g., how to decompose a problem into more manageable parts and how to combine those parts into an overall solution) and apply them to solve real problems in bioinformatics using the R and/or Python programming languages. Domain-specific projects and labs will be assigned throughout the course to encourage students to apply computing to multiple areas of bioinformatics.

COSC 111 Computational Thinking and the Art of Programming

(3 credit hours)

An introduction to the thought processes of computer science and the art of programming. Topics include learning to think algorithmically, and solve problems efficiently, using a high-level programming language and a variety of software tools and technologies. Skills learned include designing programs to solve problems, developing the algorithms needed, using abstractions, data structures and encapsulation, writing code to implement algorithms, testing the code for errors, and documenting the process and the outcome. This course welcomes students with limited or no programming experience. *Satisfies Volunteer Core Requirement: (QR)*

BSE 464 Data Analytics in Agricultural and Ecological Systems

(3 credit hours)

This course provides students with the fundamentals of data science and modeling for analyzing environmental, ecological, and agricultural systems using the open-source software R. Note that prior programming experience is not required. This course is organized into the following sections: (1) introduction to programming in R, including the development of skills for cleaning environmental data, summarizing data, and creating visualizations, (2) overview of data-based and process-based

modeling approaches, (3) applications, evaluation, and challenges of modeling in relation to environmental systems. Students will gain a broad understanding of different analytical tools and learn to apply such methods to agricultural and ecological data. This course is designed for students in a natural resources and life sciences discipline. *Credit Restriction:* Students may not receive credit for both BSE 464 and BSE 564. *Prerequisite(s):* MATH 125 or MATH 141; CHEM 122 and CHEM 123; BSE 234 or CHEM 132 and CHEM 133; STAT 201 or STAT 251

COSC 420 Biologically Inspired Computation

(3 credit hours)

Recent developments in computational methods inspired by nature, such as neural networks, genetic algorithms, evolutionary programming, ant-swarm optimization, artificial immune systems, swarm intelligence, cellular automata, multi-agent systems, cooperation, and competition. *Recommended Background:* Completion of core courses.

EEB 403 The Evolution of Cancer: An Integrative Approach

(3 credit hours)

Cancer is a family of diseases that plagues all multicellular organisms. This course presents an integrated view of cancer biology at both the cellular, tissue, organismal, and population level using fundamental concepts from micro- and macro- evolutionary biology as well as mathematical and molecular genetics. *Recommended Background:* BIOL 240 and/or BIOL 280.

EEB 406 Models in Biology

(3 credit hours)

Difference and differential equation models of biological systems. *Satisfies Volunteer Core Requirement:* (EI). *Prerequisite:* MATH 142 or MATH 148 or MATH 152

EEB 411 Biostatistics

(3 credit hours)

Experimental design and hypothesis testing for ecology and evolutionary biology research. Parameter estimation, general linear models, generalized linear models, maximum likelihood, and permutation approaches, and their application to problems in ecology and evolutionary biology. *Satisfies Volunteer Core Requirement:* (QR). *Prerequisites:* MATH 141 or MATH 151

MICR 411 Microbial Genetics

(3 credit hours)

Mechanisms of gene regulation as well as genetic and phenotypic variation in prokaryotic and eukaryotic microorganisms. *Prerequisites:* BIOL 220 and BIOL 240. *Recommended Background:* MICR 321

MICR 470 Microbial Ecology

(3 credit hours)

Physiological diversity and taxonomy of microorganisms from natural environments. Emphasis on the functional role of microorganisms in natural and simulated ecosystems. *Prerequisite:* BIOL 220

MICR 479 Advanced Techniques in Nucleic Acid Sequencing

(3 credit hours)

Capstone, student-driven research experience. Introduction to nucleic acid isolation, sample preparation, traditional and high-throughput sequencing technologies and data analysis. Emphasis on oral presentations and written reports. *Prerequisites:* BIOL 220, BIOL 229, and BIOL 240 or permission of instructor. *Recommended Background:* MICR 321 and MICR 329. *Registration Restriction:* Minimum student level – senior.

MICR 480 Genomics and Bioinformatics

(3 credit hours)

Fundamentals of a new scientific discipline based on sequencing genomes (entire DNA) of individual organisms. Goals, principles, and types of genome analysis are covered in a traditional lecture course. Computational tools for genome analysis (bioinformatics) are presented in both lecture and hands-on (computer laboratory) settings. *Credit Restriction:* Students may not receive credit for both MICR 480 and MICR 540. *Prerequisite:* BIOL 240.

7. Describe admissions and graduation requirements for the program.

Students seeking admission to the undergraduate certificate in Bioinformatics program must meet the admissions standards established by the Undergraduate Council (Appendix E). Students may pursue this undergraduate certificate on a full-time or part-time basis. They must earn all hours of this program at the institution. Students must complete the required courses with a 2.0 GPA or higher to earn the Bioinformatics undergraduate certificate.

8. Provide the planned method(s) of delivery, as defined in policy, of the program.

The undergraduate certificate in Bioinformatics will be offered in person and online.

9. Provide the planned location(s) at which the program will be delivered, i.e., on-campus and/or at specific off-campus instructional site(s). (Providing this information does not replace submitting a notification or prospectus for approval, if necessary, of an off-campus instructional site as required by policy.)

The undergraduate certificate in Bioinformatics will be offered at the Knoxville main campus.

10. Demonstrate compliance with Standard 10.7 (policies for awarding credit) of the Principles of Accreditation.

For classes that are taught in-person and online in a traditional lecture-based format over the course of a semester with 14 weeks of instruction, one credit represents 50 minutes per week of direct faculty instruction in a face-to-face classroom setting and a minimum of 100 minutes per week, outside the classroom setting, during which a student engages actively with the course content. The undergraduate certificate in Bioinformatics program will consist of 12 credit hours delivered through four 3-credit courses. Each class will provide at least 700 lecture hours of instruction per credit hour, in accord with the institution's credit hour definition.

11. Describe administrative oversight to ensure the quality of the program.

Ms. Laura Hardy, Senior Academic Program Coordinator will monitor program data and gather relevant information for program assessment. She will also serve as the initial point of contact for faculty support for the undergraduate certificate in Bioinformatics program.

Ms. Hardy reports to Dr. Vandana Singh, Assistant Dean of Faculty Affairs and New Programs. Dr. Singh will work directly with faculty and the student affairs team to monitor program progress, analyzing program data and both instructor and student feedback to identify opportunities for continued program growth and improvement.

Dr. Singh reports to Dr. Ozlem Kilic, Vice Provost and Founding Dean of the College of Emerging and Collaborative Studies. She has extensive experience in higher education administration and has served as a Director and Associate Dean, as well as Vice Provost for Academic Affairs, prior to joining the College of Emerging and Collaborative Studies.

12. For a program offered in compressed time frames, describe the methodology for determining that levels of knowledge and competencies comparable to those required in the traditional formats have been achieved.

N/A, as the undergraduate certificate in Bioinformatics is not offered in compressed time frame.

13. Provide Common Content B – Faculty Qualifications, relative to the proposed change.

- 1. Provide a completed Faculty Roster Form to include faculty members scheduled to teach in the proposed substantive change (program, site, arrangement, etc.). Follow the Faculty Roster Form Instructions which require the institution to demonstrate the qualifications of each faculty member to teach the courses assigned (refer to Standard 6.2a (faculty qualifications) of the Principles of Accreditation). Use the standard Faculty Roster Form and instructions; do not create a new form or format:**
 - a. Faculty Roster Form [DOCX]**
 - b. Faculty Roster Form Instruction [PDF]**
- 2. Include on the Faculty Roster Form all faculty members for the courses to be taught; do not include historical teaching assignments unless they are also to be taught in the proposed change.**
 - a. For a program: list the faculty members for all courses in the curriculum; exclude general education courses, if applicable, unless the general education curriculum is the substantive change being submitted for review.**
 - b. For an off-campus instructional site: list the faculty members for all courses to be taught at the site for the first 12 months of operation.**
- 3. Do not submit faculty curricula vitae or transcripts.**
- 4. Referring to Standard 6.2a (faculty qualifications):**
 - a. For a program: demonstrate the institution has at least one faculty member qualified in the discipline to develop the curriculum and/or teach in the program.**

- b. For a site: demonstrate the institution has at least one faculty member qualified in the discipline to teach at the site.**

The Faculty Roster Form for the undergraduate certificate in Bioinformatics program can be found in Appendix F. The Faculty Roster Form provided includes faculty who will be teaching the courses listed as part of the program curriculum.

- 5. Provide narrative with supporting evidence to demonstrate the number of full-time faculty members will be adequate to support the proposed change. In addition to at least one faculty member qualified in the discipline, include any to-be-hired faculty members, if applicable, on the Faculty Roster Form (e.g., “To-be-hired #1,” “To-be-hired #2,” etc.) with the expected qualifications for teaching the courses assigned. Describe the impact on faculty workload of the proposed change.**

All faculty teaching in the undergraduate certificate in Bioinformatics program (except one) have earned terminal degrees in the related field of study, have demonstrable expertise for the instruction of course content, and have been appointed by the institution as faculty with status as a tenure-track professor, associate professor, assistant professor, or non-tenure track adjunct, lecturer, or teaching assistant/associate professor. The exception is Ms. Veronica Brown who holds an MS in Ecology and Evolutionary Biology and is the Lab Manager of Genomics Core at the institution. CECS recently hired Dr. Emam Fatah, who is qualified to teach courses for the undergraduate certificate in Bioinformatics program. One additional faculty member will be hired by CECS in AY 2024-25 to support CECS interdisciplinary programs, including the undergraduate certificate in Bioinformatics program. This “to-be-hired” faculty member will also teach BINF 201 and BINF 202, in addition to other CECS courses that align with their expertise. There will be no impact on existing faculty workload.

- 6. For a graduate program,**
 - a. demonstrate scholarship and research capability of faculty members teaching in the program and**
 - b. if applicable, document faculty experience in directing student research or creative work (always applicable for doctoral programs).**

N/A, as this is not a graduate program.

14. Provide Common Content C – Resource, relative to the proposed change.

Library and Learning/Information Resources

- 1. List and describe discipline-specific learning resources to support a new program. Do not list all library resources; include only those related to the proposed change. If electronic databases are listed, describe the discipline-specific suites of resources rather than the name only of the database or the consortium through which it is accessed (Such as Galileo, Louis, TexShare, Viva, etc.).**

No new library resources will be needed to serve students in the undergraduate certificate in Bioinformatics program. UT Libraries offers students a broad collection of library resources that support learning and course activities. Databases available to students include the BioCYC Genome Database Collection and Current Protocols which houses a Bioinformatics section that serves as a comprehensive resource for best practices in bioinformatics.

2. Document discipline-specific refereed journals and primary source materials. This is particularly important for graduate programs and especially important for doctoral programs.

Students are able to utilize OneSearch to search journals by category on the UT Libraries website. There are 84 journals readily available in the “Bioinformatics” category, including *Nature Methods* and *Bioinformatics*. Further, OneSearch provides students with access to e-journals available through BrowZine, such as *GigaScience* and *Bioinformatics Advances*. Students may also utilize Resource Sharing to borrow materials not available at UT Libraries.

3. Describe how students enrolled in a new program, at an off-campus instructional site, or in a distance education program can access discipline-specific library and learning/information resources.

The undergraduate certificate in Bioinformatics will be offered in person and online. All library resources identified in previous responses are made available online to students in the program with a valid UT Knoxville NetID and password.

4. Describe how students are made aware of library and learning/information resources available to them, how they can learn how to access the resources and are instructed in the use of online resources, as well as on-site library resources.

Students are made aware of library and learning/information resources via course syllabi and individual course orientation. Faculty often provide students with guidance regarding the existence of resources relevant for class projects and assignments and how to access and use those resources. As part of coursework, such information is commonly posted in the Canvas site of respective courses and discussed in class (where hands-on training on the use of such resources is often provided). The UT Libraries has an extensive website, which also serves to educate students regarding all available resources and support services.

5. Describe resources to support students in access to and use of library and learning/information resources.

As described above, students are provided with access to library guides and a specialized librarian who can guide students on accessing library materials and information sources. Further, students have access to UT Libraries digital databases and AskUsNow, where they can chat with a librarian or get information on how to otherwise connect with a librarian. They can also request materials through Resource Sharing.

Student Support Services

- 1. Describe specific programs, services, and activities which will support students enrolled in the new program and / or enrolled at a new off-campus site /additional location and / or enrolled in distance education programs. Do not list student support services which are not relevant to the specific change.**

Academic and student support activities, programs, and services at UT Knoxville are offered in centralized and decentralized formats. Decentralized support varies and is provided at the college, department, and program level. Centralized support is provided by a variety of units including the Division of Enrollment Management; Division of Student Life; Division of Access & Engagement; Athletics; the Office of Research, Innovation and Economic Development; and the Office of the Provost.

Academic Advising

Each college at UT Knoxville provides undergraduate academic advising services to assist students in navigating the educational and professional questions that arise during the course of their studies. Academic advising services for students in this program will be provided by professional advisors at CECS.

The RISE Program

The Responsive Industry Support Ecosystem (RISE) Program matches industry and professionals with learners pursuing careers in emerging employment sectors such as Data Science, Artificial Intelligence, Cybersecurity, and Sustainability. RISE is comprised of four components: RISE Base Camp, RISE Climb, RISE Team, and RISE Summit with RISE Base Camp serving as the cornerstone.

RISE Base Camp is open to all UT Knoxville students and introduces participants to industry professionals in the RISE Network who are in various stages of their careers, from early-career to seasoned professionals. Meetings are held every other week during the semester, inviting students to listen in as professionals share about their career journey. Students then have an opportunity to ask questions and network over dinner.

In RISE Climb, students develop a personalized professional growth and mentorship plan, flexibly explore other connections, and complete a series of professional development benchmarks by utilizing available resources at CECS and on campus. RISE Climb is open to any student enrolled in a CECS program.

Students who complete RISE Climb are eligible for RISE Team, a team mentorship with a relevant member of the RISE Network. This includes two 30-minute virtual mentorship sessions with a mentor and a small team of similarly interested learners per semester. RISE Team is open to any individual enrolled in a CECS program and begins summer 2025.

Students who complete their RISE Team mentorship, and are CECS majors, are eligible for individual recognition by the RISE Network. These individuals will present the outcome of their

internship, research, service, co-op, or capstone experience during the CECS RISE Summit Industry Showcase in spring 2026.

Career Catalyst

Career Catalyst is a dynamic annual event that connects leaders from corporations, small businesses, start-ups, government agencies, and higher education to envision collaborative initiatives to create a high performing and talented workforce for emerging and future careers. The event is led by the College of Emerging and Collaborative Studies and is by invitation only. Career Catalyst 2025 took place on April 10, 2025.

Physical Resources

1. Describe the adequacy of physical facilities which will support the change.

Existing facilities will be used to implement the undergraduate certificate in Bioinformatics. The college's administrative and faculty offices are located on the first floor of the Philander P. Claxton Education building. Each faculty member has approximately 65 square feet of office space. Currently, CECS does not have any college/department owned classroom space. Classrooms for the courses included in this program are assigned by the Registrar's Office and vary in square footage based on campus location.

2. Describe equipment which will be available for a new program or available at a new site.

No specialized equipment is necessary or employed as part of the undergraduate certificate in Bioinformatics program.

3. Describe the impact that the proposed change will have on physical facilities and equipment for existing programs and services.

All physical facilities, equipment, and services that are needed for the undergraduate certificate in Bioinformatics program are already in place.

Financial Resources

1. Describe in narrative the financial resources needed to initiate and provide on-going support of the proposed change.

By fall 2025, when this certificate is launched, the College of Emerging and Collaborative Studies will have eight full-time, non-tenure-track faculty members who will teach the courses for the undergraduate certificate in Bioinformatics program. As stated earlier, CECS recently hired Dr. Emam Fatah, who is qualified to teach courses in the program. One additional faculty member will be hired by CECS to support CECS interdisciplinary programs, including the undergraduate certificate in Bioinformatics. No new faculty will be hired for this program once the to-be-hired faculty member begins on August 1, 2025.

For the first year (AY 2025–2026) of the program, a budget of \$1,950 has been established. This budget includes \$500 for communication and marketing materials, \$250 for recruitment efforts, \$700 for advising support, and \$500 for academic administration. There are no additional costs

allocated for external institutions or organizations for contractual or support services, as the necessary services are already in place.

Projected financials for the program are favorable. Expenditures are projected to remain steady at \$3,100 annually over the first three years. Revenue is expected to be \$18,480 in Year 1, increasing to \$27,720 in Years 2 and 3, leading to a positive net revenue of \$15,380 in Year 1 and \$24,620 in each subsequent year. These figures assume 10 students taking two courses annually, at a tuition rate of \$385 per credit hour with 80% of tuition revenue returning to CECS.

As a contingency, CECS plans to evaluate enrollments after three years. If the program does not meet enrollment expectations, the marketing strategy will be adjusted. Given that the program expenses are relatively modest compared to CECS's overall budget, they can be absorbed if necessary. CECS will also conduct annual cost assessments and adjust expenditures as needed if costs per student exceed projections.

2. Provide a budget for the first year of the proposed change.

Expense	AY 2025-2026
Communication and Marketing Materials	\$500
Recruitment	\$250
Advising	\$700
Academic Administration	\$500
TOTAL	\$1,950

3. Include in the budget resources to be directed to institutions or organizations for contractual or support services for the proposed change.

N/A, as all support or contractual services are already in place for the program.

4. Include projected revenues and expenditures and cash flow for the proposed change.

All of the classes in the undergraduate certificate in Bioinformatics program must be serviced due to their inclusion in undergraduate majors in CECS. Therefore, additional faculty effort has not been included. If the popularity of the certificate program increases to the point of warranting additional classes, it will, by definition, have a projected revenue that meets or exceeds the expenditure. CECS calculated the expenditures by projecting the first year budget and assuming efficiencies rather than growing expenses. For revenue, CECS assumes that students will take two classes per year, on average. Some students may complete all certificate requirements in a year, and others may proceed more slowly. While CECS uses the greater number of students in estimated enrollment range to estimate the costs, the smaller number of students in the range is used to estimate revenues (see below).

	Year 1	Year 2	Year 3
Expenditures	\$3,100	\$3,100	\$3,100
Revenues	\$18,480	\$27,720	\$27,720
Net (R - E)	\$15,380	\$24,620	\$24,620

Note: Tuition is taken from the fall 2024 rate of \$385 per credit hour with 80% of tuition returning to CECS. The table above assume 10 students taking 2 classes per year.

5. Include a contingency plan should expected revenue does not materialize or should costs exceed estimates.

CECS will assess enrollments in the new program after three years of operation. If it fails to achieve expected enrollments, CECS administrators will re-evaluate and adjust its marketing strategy. However, expenses for this program are a small part of the CECS budget and can be absorbed by the overall budget. CECS will assess costs annually. If at any point costs per student exceed expectations, spending will be modified, as appropriate.

15. Provide Common Content D – Institutional Evaluation and Assessment Processes, relative to the proposed change.

1. Provide a brief description of institutional assessment processes.

Student learning outcomes for the undergraduate certificate in Bioinformatics program are included in the annual program assessment process. Data are collected and analyzed by department faculty annually and reported formally every three years. The analysis and reporting requirements are focused on seeking improvement in student learning.

Student assessment of all academic courses and instructors is accomplished through the use of end of course evaluations. Course evaluations address topics such as quality of instruction, adequacy of facilities, adequacy of library resources, technology, and faculty availability (outside of class time). The instrument used for these evaluations is the same for all locations and methods of delivery. Course evaluation results are also shared with the administration.

2. Describe how the institution will incorporate the proposed change into the institution-wide assessment infrastructure and processes.

The institution's annual program assessment of student learning outcomes is coordinated through the Department of Institutional Effectiveness, which works with program faculty to develop appropriate outcomes, assessment methods, and to interpret results for continued program improvement. The department conducts an annual meta-assessment review and prepares a summary report, which is shared with faculty and the administration.