As part of the West Virginia University Board of Governor's Rule 2.2 Program Review process, the WVU Provost's Office required that a single Program Review Self-Study Form be completed on behalf of all identified programs in the department or unit. This Program Review Self-Study Form was to be submitted to the Provost's Office by end of day on August 1, 2023. The Provost's Office reviewed the submitted Program Review Self-Study Forms in early August.

Self-Study content is unvetted by the Provost's Office. As such, the WVU Provost's Office cannot attest to the accuracy of any data, analyses, or statements provided within. Also, redactions were made where warranted for the protection of individual identities around sensitive information.

Q1.1.
BOG Program Review Self-Study Form

This is the self-study form that will be completed in support of the summer 2023 academic transformation program portfolio review.

Only one program review self-study is to be submitted per unit; all of the unit's *programs* will be covered by one self-study.

Q1.2. Select the appropriate academic unit under review.

College	Benjamin Statler College of Engineering and Mineral Resources ˅
Department or School	Computer Science and Electrical Engineering ˅

Q1.3. List all of the unit's programs.

Example:

BA Biology
BS Biology
MS Biology
PhD Biology

LCSEE offers following BS programs: a) BSBSE: Biometric Systems Engineering (BSE) b) BSCPE: Computer Engineering (CpE) c) BSCS: Computer Science (CS) d) BS Cybersecurity (CYBE) e) BSEE: Electrical Engineering (EE) Students are also able to register for a dual UG major with the following programs: a) BSE and CpE, b) BSE and EE, c) BSE with CS, d) CS and CpE, e) EE and CpE, f) CS and CYBE. Additionally, students can also take CpE and CYBE as a dual major. Also, students can have CYBE as an Area of Emphasis (AoE) and can take CS as a minor. LCSEE Department offers the following graduate programs: MSSE: Online MS in Software Engineering with Coursera MSCS: MS in Computer Science MSEE: MS in Electrical Engineering Ph.D. in Computer Science Ph.D. in Computer Engineering Ph.D. in Electrical Engineering

Q1.4. Name and Email of the person completing the self-study

Name

Anurag K Srivastava

Email Address

anurag.srivastava@mail.wvu.edu

Q1.5. How were faculty given the opportunity to contribute to, review and provide feedback on this self-study?

Faculty were informed by sharing the formal review letter through email on July 10th. The completed draft form was shared with faculty on July 25th for comments. Faculty members had till July 31st to provide additional feedback on the draft form. They can do so by completing the online comment form, sending an email, or discussing in person. Finally, our department also hosted a Zoom meeting on July 28th from Noon to 1 PM to discuss the draft responses. Dean Mago also hosted a session with LCSEE faculty on June 12, 2023.

Q2.1. Explain how the unit and its programs contributes to WVU's mission.

This response is limited to 7500 characters, approximately 2 single spaced pages.

WVU's mission as an educational institute is driven by its land-grant status, with a focus on agriculture, science, military science, and engineering. Some of the WVU goals include advancing healthcare, prosperity, access, and opportunity for the state of West Virginia through high-quality education and high-impact research, considering a diverse and inclusive culture. Our LCSEE programs are "state priority programs" as part of the University's Land-Grant mission, meaning they directly serve WVU's mission and important industry sectors. Our programs develop the theoretical and practical foundations for information technologies, computation, energy, electronic devices, cybersecurity, healthcare, agriculture, and military applications. They enable innovation and directly impact national priorities in healthcare, clean energy, and national defense. Our programs contribute to all the specific areas that President Gee envisions WVU to be a global leader in: astrophysics, energy and sustainability, cancer detection, and artificial intelligence and robotics (see Evidence A and B). LCSEE is partnering and developing ongoing relationships with various corporations to support workforce development, student internships, scholarships, laboratory sponsorships, guest professional speakers, and other similar collaborative ventures. The list is long, but to name a few: Leidos, L3 Harris Technologies, KeyLogic, Orbis, IDEMIA NSS, Agile5 Technologies, ManTech International, Trilogy, Garman Engineering, GM, First Energy, SEL, AEP, GE, Siemens, SAIC, ComEd, Meta, Alphabet Inc., Microsoft, Amazon, and Northrup Grumman. Government agencies within the region are also among our department's regular research collaborators, including FBI CJIS, CISA, DoD BIMA, NOAA, NETL, NSA, NASA IV&V, and other DoD, manufacturing, software development and Intelligence agencies. Program Objective Statement by programs: BSBSE: The Program Educational Objectives (PEO) of the Biometrics Systems Engineering program at the West Virginia University is to produce motivated graduates who will apply their programming, hardware implementation, and systems engineering skills to biometrics applications and achieve success in their careers in industry, research, government service, or academia. These graduates will strive to ensure that biometric systems are used properly and protect individual privacy. It is expected that, in the first five years after graduation, our graduates will achieve success and grow in proficiency in their profession, be recognized as leaders, and contribute to the advancement of society. BSCS: The Program Educational Objectives (PEO) of the computer science program at the West Virginia University are to produce graduates who will apply their knowledge of programming languages and paradigms, software development processes, hardware, services, the theory of computation, and other computing topics to achieve success in their careers in industry, research, government service, or academia. It is expected that early career graduates will demonstrate their adaptability to new technologies as they achieve success and proficiency in their profession, become recognized as leaders, and contribute to the betterment of society. BSCpE: The Program Educational Objective (PEO) of the Computer Engineering (CPE) program at the West Virginia University is to produce graduates who will apply their knowledge and skills in computer systems and design to achieve success in their careers in industry, research, government service or graduate study. It is expected that in the first five years after graduation our graduates will demonstrate their adaptability to new technologies as they achieve success and proficiency in their profession, be recognized as leaders, and contribute to the well-being of society. BSEE: The Program Educational Objectives (PEOs) of the Electrical Engineering program at the West Virginia University is to produce graduates who have broad knowledge of electrical hardware and related software, as well as skills in project management, communication and learning to achieve success in their careers in industry, research, government service, or academia. It is expected that in the first five years after graduation our graduates will achieve success and proficiency in their profession, be recognized as leaders, and contribute to the betterment of society. BSCYBE: The Program Educational Objectives (PEO) of the Cybersecurity program at the West Virginia University is to produce graduates who have theoretical knowledge and practical hands-on skills with cutting edge technology and cybersecurity tools to apply in their careers in industry, research, government service, or academia. It is expected that in the first five years after graduation our graduates will achieve success and proficiency in their profession, be recognized as leaders, and contribute to the betterment of society.

Q3.1.
Resources, Revenue, and Expenses

The purpose of this section is to ensure the accessibility and adequacy of the unit's infrastructure and resources and its financial viability.

Responses in this section are limited to 7500 characters or approximately 2 single spaced pages.

Q3.2. Has the unit experienced significant issues with any of the following during the past five years?

By "significant," we mean issues that interfere with either the unit's ability to deliver its programs to its students or the students' ability to complete those programs in a timely manner.

	Yes	No
Ability to schedule required classrooms	●	○
Access to adequate technological infrastructure	○	●

| Access to adequate technological support | ○ | ◉ |
| Access to adequate physical infrastructure (labs, performance spaces, etc.) | ◉ | ◉ |

Q3.3. Describe the issues the program has faced in the area(s) identified above.

With the highest number of credit hours taken by students in LCSEE (a total of 21,726 SCH in FY 22) compared to any other department in the Statler College, and a growing number of students with CS major and minor, as well as CYBE major and AoE, finding an appropriate classroom size without creating additional sections has been an issue (see Evidence C, with two tabs, and Evidence D). The higher number of SCH is due to students from other departments and colleges taking our courses, resulting in a high SCH/faculty ratio (EE: 429 SCH/faculty, CpE: 462 SCH/faculty, CS: 1314 SCH/faculty, BSE: 670 SCH/faculty, and CYBE: 355 SCH/faculty, as shown in Evidence C). Our faculty share the teaching load across all 11 degree programs. While some programs have enough faculty, others are marginally staffed and require more resources. CYBE, CpE, and CS are particularly resource-constrained, as shown in Evidence D, which illustrates the student/faculty ratio for specific programs in LCSEE. This, in turn, leads to larger class sizes for some of the CS, CYBE, CpE, and EE courses. Our students are often on the waitlist due to limits on classroom size, which can result in delays in completing their programs in a timely manner.

Q3.4. Data have been provided on the unit's last three years of tuition revenue, expenses, and net revenue. Address any negative net revenue or any significant changes (positive or negative) to unit's net position.

Revenue by department is the actual tuition revenue, net of any discounting, paid by students taking courses in course subject codes affiliated with the department.

Expense by department is the actual unrestricted, operating expenditures by department within the functions of instruction and academic support.

Net revenue is the revenue minus the expense.

Based on the data provided by the provost's office (also shown as Evidence E), our net 3-year average revenue o er 2020-2022 was (-$913,371). In 2022, the change in tuition revenue compared to 2020 was (-$2,270,352), and the change in expenses was +$235,819. The decline in tuition revenue can be attributed to a decline in enrollment or a decline in student credit hours (SCH). Also, the decline in enrollment may be attributed to our majors successfully graduating with their degrees in our department or may be due to a drop in student enrollment from other majors taking courses in our department. LCSEE is doing reasonably well in terms of student enrollment. As indicated by data from the Provost's office in Evidence E, our student enrollment in the department declined in Fall 2022 (Total 475) by -3.35% compared to the median of Fall 2018-Fall 2021 (Total 491.5). Additionally, Student Credit Hours (SCH) declined by -4,114 (from 25,840 in 2020 to 21,726 in 2022). Observing SCH data by courses as shown in Evidence C, a major SCH decline is seen in CS 101, a service course offered by LCSEE. This decline is primarily due to a similar course now being offered by other departments and colleges. SCH for CS 101 declined by 3728 (from 7820 in 2020 to 4092 in 2022). Chambers College created a new BCOR 121 course that their students are now required to take instead of CS 101, which is the primary driver for the decline in CS 101 SCH. Additionally, LCSEE and the college reduced credits for the MS degree requirements from 33 to 30 credits. These four factors, namely a) CS 101 decline, b) reduced MS degree requirements, c) higher graduation rate, and d) slightly declined enrollment, resulted in an overall SCH and tuition revenue decline, even with a slight decline in enrollment. However, the tuition revenue decline does not truly reflect our department, as the decline in CS 101 enrollment contributes to 90.62% of the overall tuition decline. CS 101 is mainly taken by students from other departments and is offered to help other departments and colleges. Our true tuition decline is -$212,959 instead of -$2,270,352, as reported by the provost's office data, by offsetting the tuition decline due to CS 101 (calculated by taking 9.38% of the total tuition decline). Additionally, this decline is partly offset by increasing overhead return for the department and faculty accounts combined (FY20: $164,699.97, FY21: $139,887.28, FY22: $214,149.27). Including overhead return and offsetting CS 101, our revenue is actually positive by $1,190. Furthermore, the profitability of the online MSSE as extended learning and summer school for CS 101 generates additional revenue for the department. LCSEE is taking multiple steps to increase revenue through recruiting and retention efforts, as well as by increasing research expenses. LCSEE plans to offer two additional online MS degrees in a) Computational Data Analytics and AI and b) Critical Infrastructure Cybersecurity, as well as a minor or AoE in Robotics for UG students working with the MAE department. Additionally, foundation accounts are seeing increases in donor contributions. Our expenses in 2022 increased by $235,819, mainly due to startup costs for new faculty hires and multiple new initiatives for recruiting, retention, and visibility. Note that faculty startup costs are not permanent costs. Statler College and the department are taking multiple steps to decrease expenses, including virtually eliminating faculty startup costs from their budgets going forward through the transfer of the budgets to college Foundation funding and the elimination of support from the Provost's Office. Also, costs may have been higher than normal in the recent past due to heavy turnover in high-demand fields and retirements. Additionally, the department has worked with faculty to decrease the number of GTAs and adjuncts to lower expenses. Please see the response for Q 6.2 for additional efforts for the operational efficiency of LCSEE.

Q4.1.

Faculty Composition and Productivity

Responses should be concise but also specific and supported by evidence. Responses in this section are limited to 7500 characters or approximately 2 single spaced pages.

Specific data definitions for these metrics are available on the [Academic Transformation](#) webpage.

Q4.2. Data have been provided on the unit's faculty full-time equivalency (FTE) to the median of all majors for fall 18 to fall 22.

Address any differences in the unit's student to FTE ratio and the institution's student-to-faculty ratio of 18-to-1 per IPEDS reporting for academic year 2021-2022.

As reported by the Provost's office data (evidence E), our student-to-faculty ratio of 20 is already higher than the institution's student-to-faculty ratio of 18. For FY 22, the student-to-faculty ratio was 21. As we analyze the data for the student-to-faculty ratio by program, we observe that this number is significantly high and skewed for CS and Cyber students-to-faculty ratio (see evidence D). Considering the weighted student ratio to include minors and AoE, the student/faculty ratio is as follows: BSE: 20, CpE: 21, CS: 33, EE: 16, and CYBE: 25 (see evidence D). In Evidence D, Faculty teaching efforts for different major is based on student composition in classes during AY22-23. Even though the student/faculty ratio of EE seems to be lower than for our other major, SCH analysis for SCH/faculty ratio by major shows that EE courses are also taken by students from several other majors (see evidence C, evidence D, and Evidence G). Evidence G indicates that EE courses are also being taken by CpE and BSE students, highlighting the interdependence of LCSEE majors, which is expected.

Q4.3. This question is optional and required only if a unit's doctoral programs are under review.

Data have been provided on the unit's tenure-track / tenured FTE to doctoral student headcount ratio across all of the unit's doctoral programs.

Address any differences in the unit's doctoral student to tenure-track and tenured faculty FTE ratio to the institutional expectation of 2-to-1.

NA

Q4.4. Data have been provided that show the changes to the unit's total number of faculty over the review period. Data have also been provided that show the total student headcount enrolled in all of the unit's programs over the same period of time as well as a three-year trend in student credit hour (SCH) production.

Explain the relationship between the change in the number of faculty in the unit and the change in the units total headcount enrollment and SCH production trends.

Our undergraduate enrollment has stayed nearly the same and declined by ~3%. Faculty count remains almost unchanged. Given enrollment trends and the number of faculty, the student/faculty ratio has not changed significantly. What is more important, however, is the Student Credit Hours (SCH)/Faculty ratio due to the number of students taking classes across our majors and students from other departments and colleges taking our classes, increasing the teaching load of our faculty. As shown in Evidence C, our SCH/faculty ratio is one of the highest among other departments in the college, with 701 SCH/faculty. For each major, our SCH/faculty ratios are as follows: EE: 429, CpE: 462, CS: 1314, BSE: 670, and CYBE: 355 during FY22. When observing SCH data by courses as shown in Evidence C, a significant decline in CS 101 SCH is evident. This decline is primarily due to a similar course now being offered by other departments and colleges. SCH for CS 101 declined by 3728 (from 7820 in 2020 to 4092 in 2022). Chambers College created a new BCOR 121 course that their students are now required to take instead of CS 101, which is the primary driver for the decline in CS 101 SCH. Additionally, LCSEE and the college reduced credits for the MS degree requirements from 33 to 30 credits. These factors resulted in an overall SCH and tuition revenue decline, even with a slight decline in enrollment. However, the tuition revenue decline does not accurately reflect our department since 90.62% of the overall tuition decline is attributed to the decline in CS 101 enrollment. Our true tuition decline is -$212,959 instead of -$2,270,352, as reported by the Provost's office data, by offsetting the tuition decline due to CS 101 (calculated by taking 9.38% of the total tuition decline). To account for the declining enrollment in CS 101, LCSEE has reduced the number of sections and eliminated GTA, part-time instructors, and lecturer positions, as shown in Evidence H.

Q4.5. Data have been provided that shows the unit's research expenditures per the Higher Education Research and Development Survey (HERD).

Does this data capture all of the unit's research expenditures? If not, explain the difference here and provide evidence of additional research expenditures below.

LCSEE research expenditure has been increasing over the years, and the reported data of $5,337,139 is very close to the data recorded by the Statler College (see evidence F). However, it's important to note that this data does not include internal resources used to support research and lab setup for new faculty members, nor does it include donations received from our donors towards research.

Q4.6. Upload evidence of research expenditures here.

[Evidence F FY22ResExps_3yrHistory.pdf](#)
62.6KB
application/pdf

Q5.1.
Student Enrollment and Graduation History

Responses in this section are limited to 7500 characters (approximately 1.5 single spaced pages).
Responses should be concise but also specific and supported by evidence.

Specific data definitions for these metrics are available on the [Academic Transformation](#) webpage.

Q5.2. Data have been provided on all of the unit's program's student enrollment trends.

That data includes:

4-year median fall enrollment (fall 18 through fall 21);
Fall 2022 change from 4-year median (in headcount and in percentage).

Units should address any programs with enrollment below the median for the program level or which has experienced a negative change in enrollment.

Overall, the enrollment numbers for LCSEE have remained relatively stable, with a minor change of approximately 3%. As reported by the Provost's office data in Evidence E, the headcount for various BS programs has shown varying trends: ● BS BSE experienced a decline of -13.5 in headcount (-44%). ● BS CpE saw a decrease of -7.5 (-6%). ● BS EE witnessed a significant decrease of -38.5 (-31%). ● BS CS showed a slight increase of 6 (+3%). ● BS CYBE had a notable increase of 37 students (264%). It is important to note that for programs with low enrollment, the percentages may be skewed, warranting further attention to address any imbalances. Additionally, FY 2023 data as of June 30th reveals positive developments in enrollment: EE enrollment rebounded by 12%; and CS and CYBE enrollments also experienced slight increase. As we continue our efforts to improve enrollment and adapt to changing trends, it is vital to consider the unique nature of the BSE program. While it serves both local and national industries, it requires minimal dedicated efforts and costs due to faculty sharing with other programs. Indeed, if the BSE degree program were to be eliminated, it is not clear that any course sections would be eliminated, as all are taken by students in other majors. On the other hand, we have observed a national trend of enrollment decline in EE, influenced by shifting student interests. This indicates that maintaining the same enrollment expectations for all programs may not be practical, necessitating a dynamic approach that aligns with students' interests and industry demands, as President's Gee rightly pointed out (Evidence A). Furthermore, it is essential to consider the impact of dual majors and Areas of Emphasis (AoE) on our overall enrollment: ● Dual Majors: LCSEE has 43 students pursuing dual majors within the programs. These students take a higher number of courses to obtain their dual degree, but data from the Provost office is based on counting only their primary major. The breakdown of dual majors is as follows: 1 BSE – CPE, 1 BSE – EE, 1 BSE – CS, 20 CPE – EE, 19 CPE – CS, 1 CS – CYBE ● CYBE AoE: In addition, 50 students have chosen the Cybersecurity AoE, distributed across different programs as follows: 2 BSE, 10 CPE, and 38 CS students ● CS Minor: The department has 28 students pursuing the CS minor, comprising students from various programs, including: 13 CPE, 2 BSE, 1 CYBE, 12 EE, and 24 students from other engineering departments In an effort to provide a comprehensive view of enrollment, we have also considered the impact of major, AoE, and minor enrollments, as demonstrated in Evidence D, using a weighted ratio that resulted in slightly higher overall enrollment figures. To enhance enrollment for all programs, including those facing declining numbers like EE and BSE, we are implementing a range of strategies. Our initiatives include intensifying recruiting efforts, refining curriculum structures, and streamlining the degree program to facilitate smoother navigation for students, ultimately enabling timely graduation. These combined efforts aim to foster an environment that supports student success and strengthens enrollment across all LCSEE programs. Some of the efforts implemented to improve enrollment and enhance the student experience within LCSEE include: 1. Revisiting prerequisites and course flow: ● Prerequisite modifications were made to EE 457, EE 455, CPE 310 and CPE 435 for easing the path to graduation, but without compromising the quality of the offering. ● LCSEE collaborated with the math department to discuss topic changes and improve student math skills upon entry into the program as sophomores. 2. Course and curriculum updates and additions: ● Combined three separate Concentration Areas for CS technical electives into a single group, providing students with more flexibility in course selection. ● Changed the minimum grade required for a course to be counted and for prerequisites from C- to D- for all but the first two CS courses, mitigating potential delays in student graduation. ● Submitted a plan for accelerated Master's degree programs for integrated BS-MS in EE. ● Initiated a plan for a new MS online in AI and critical infrastructure cybersecurity. Also, planning Minor in Robotics in collaboration with MAE. ● Introduced new advanced courses, including: ● CYBE 468S: Cybersecurity Competitions for students participating in Cybersecurity competitions. ● CYBE 460: Foundation of Cybersecurity II. ● CS 474: Introduction to Responsible AI. ● CpE 593B: Hardware Security and Trust. ● Software security course. 3. The course curriculum is aligned with industry-standard certificates, making course transfer easier (e.g., CYBE 467 credit for completing the offensive security certified professional (OSCP)). 4. Developed a MATLAB code to switch from SLI schedule to a calendar Grid, avoiding conflicting schedules and dependency checks. 5. Signed a contract with Coursera for the MS online program in Software Engineering (MSSE). Also, hired a new teaching faculty in software engineering with support from the Provost office and college. 6. Expansion of lab and Integrating hands-on modules: ● Introduced new lab facilities, such as the ARMS processor in CpE 310, smart grid lab for hands-on in CpE 435, a cybersecurity competition collaboration room, and a Power Lab supported by donors and state/department of education-funded new Cybersecurity Range (evidence I). 7. Industry engagement and opportunities: ● Added industry-sponsored senior design and competitions (e.g., Leidos, SEL, WV Library, Trilogy, IDEMIA, EcoCar, Mars Rover). See evidence J for an example of industry-supported senior design. ● Participated in various cybersecurity exercises and workshops (evidence J), providing real-world experiences for students. ● Promoting new student clubs like the AI Club for experiential learning. ● Regularly hosting seminars and panels by experts. ● Hosted first-ever LCSEE Industry Day 8. Focus on student success: ● Analyzed five-year enrollment trends for all LCSEE lecture courses to guide three-year course offerings for student planning. ● Appointed a New Associate Chair of Undergraduate Studies and a New Associate Chair of Student Success to drive initiatives for student success. ● LCSEE has its own Lane Learning Center for tutoring students. ● Joined as members of the USCYBERCOM academic engagement network and AFRL Information Institute. ● LCSEE has been redesignated as a DHS/NSA cybersecurity center of excellence (evidence K). 9. Outreach and communication: ● Started LCSEE newsletter and strengthened the presence on social media for enhanced outreach. ● Formed a new industry advisory committee/ visiting committee ● Hosted LCSEE Women in Computing and Engineering for high school students. Through these multifaceted efforts, LCSEE strives to create an environment that facilitates student success and fosters continuous growth in enrollment and academic excellence.

Q5.3. Data have been provided on the unit's three-year trend in student credit hour (SCH) production.

Units should address any programs with a negative trend in SCH production.

LCSEE has the highest number of student credit hours (SCH) taken by students, totaling 21,726 SCH in FY 22, compared to any other department in the Statler College. This higher number of SCH is attributed to students from other departments and colleges taking our courses, resulting in a high SCH/faculty ratio (EE: 429 SCH/faculty, CpE: 462 SCH/faculty, CS: 1314 SCH/faculty, BSE: 670 SCH/faculty, and CYBE: 355 SCH/faculty, as shown in Evidence C). However, when observing SCH data by courses, as shown in Evidence C, a significant decline in CS 101 SCH is evident. CS 101 is a service course offered by LCSEE, and this decline is primarily due to a similar course now being offered by other departments and colleges. Specifically, SCH for CS 101 declined by 3728 (from 7820 in 2020 to 4092 in 2022). Chambers College introduced a new BCOR 121 course that their students are now required to take instead of CS 101, which is the primary reason for the decline in CS 101 SCH. Additionally, LCSEE and the college have reduced credits for the MS degree requirements from 33 to 30 credits. These factors, including the decline in CS 101 enrollment, reduced MS degree requirements, higher graduation rate, and a slight decline in overall enrollment, resulted in an overall SCH decline. It's essential to mention that the decline in CS 101 enrollment contributes to 90.62% of the overall tuition decline. It's worth noting that CS 101 is mainly taken by students from other departments, and efforts are being made to lower the resources committed to CS 101. In the future, LCSEE aims to move towards online course offerings to reach a larger number of students and increase CS 101 enrollment. For details on adjusting CS 101 resources based on enrollment to maintain higher LCSEE operational efficiency, please refer to evidence H. Overall, it is essential to continue monitoring and adapting to enrollment trends and making strategic adjustments to ensure the department's success in offering high-quality education and research opportunities.

Q6.1.
Assessment of Learning and Program Improvement

The Provost's Office will review the self-studies from the most recent Board of Governor's five-year program reviews for this section.

Units may provide updated information below if they so choose.

Q6.2. Provide the unit's plans or ideas to make significant changes to its operations, structure, offerings, or personnel in order to reduce its costs or improve its efficiency.

Provide any significant changes to the department's program curricula, its assessment of learning practices, or any other improvements that have been made since the department's programs completed their most recent Board of Governor's five-year review.

LCSEE has been actively focusing on academic efficiencies and implementing various strategies to achieve the conflicting objectives of reducing instructional costs while enhancing the quality of education and improving graduation rates. Some of the efforts undertaken include: • Revisiting faculty workloads and enforcing college and department workload policies (evidence L). • Not renewing teaching assignments for several adjuncts and part-time instructors. • Reducing the number of course offerings by merging redundant courses, such as the CpE 442 and CS 455 Computer Architecture course merger. • Increasing class sizes and the number of sections, where appropriate. • Working towards reducing the number of Graduate Teaching Assistants (GTAs) by having instructors also teach labs when suitable, like in CpE 310, EE 223 L, and EE 251L (evidence M). • Moving expenses to the foundation, where possible and appropriate. • Balancing the mix of full-time faculty by having a higher number of teaching-track faculty compared to tenure-track faculty. Over the past 3 years, the department has filled 3 new faculty hires with teaching track, rather than tenure track faculty. • Making strategic faculty hires in the right major areas to align with student academic interests and enrollment trends. All new faculty hires over the past 3 years have addressed needs in the fields of CS, CYBE, and CPE. • Introducing the new Cybersecurity degree program with minimal new resources as directed by the university administration. • Attaining ABET accreditation for BS in Cybersecurity and Biometrics Systems Engineering programs to potentially increase enrollment and academic efficiency. Note that accreditation for these programs was first achieved in Fall 2022, so that it is not yet possible to assess the full enrollment impact of the new accreditation status. • Sharing existing EE courses with other majors (CS, CpE, CYBE, and soon-to-be-approved robotics program) to further optimize academic resources. • Identifying opportunities for EE and CpE faculty to assist in filling teaching responsibilities for CS/CYBE courses. • Implementing measures to address the decline in CS 101 enrollment, such as reducing adjunct and GTA resources (evidence H). • Supporting WVU Tech's sections of CS 101, fostering resource-sharing across campuses. • Transitioning CS 101 to an entirely online asynchronous format starting Spring 2024 to improve staffing efficiency and enhance course accessibility for students. • Moving selected courses online when appropriate, such as CS 101 and CS 455 (evidence M). By implementing these measures and continually reassessing academic practices, LCSEE is committed to optimizing resources and creating a more efficient and effective learning environment for its students.

Q6.3. The program may provide additional evidence of program improvement here.

Evidence A B E F G I J K L.zip
24.3MB
application/zip

Q7.1. The unit may provide any additional context or information about the unit's programs here.

Here are some additional contexts for LCSEE outlining challenges: • The retirement of four faculty members, who played a significant role in teaching multiple courses and contributing to our programs over the last couple of years, has been a major challenge. Additionally, two faculty members left the programs due to family commitments. These vacancies were filled with adjuncts or new hires to maintain the same faculty numbers. However, new tenure-track faculty members typically teach only two courses a year. Recent budget cuts have also resulted in fewer resources for recruitment and teaching. • Our faculty members are currently sharing the teaching load across all 11 degree programs. While some programs have an adequate number of faculty, others are facing resource constraints, particularly in the CYBE and CS programs. The student-to-faculty ratio by programs can be observed in Evidence D. We express our gratitude to the Provost's office for their assistance in hiring 4 new faculty members in FY 2023 and an additional 2 in FY 2024. These new hires have been essential in replacing 4 retiring faculty members and 2 faculty members who left WVU. • Furthermore, discontinuing the Academic Common Market (ACM) program as part of university-level initiatives has impacted our overall enrollment, especially affecting the Biometrics System Engineering programs. • Over the last two years, our department has undergone five review cycles by the Board of Governors (BOG) for several of our programs, consuming significant time and effort from faculty and department leadership. Unfortunately, these reviews did not result in significant outcomes or additional resources to improve the programs. This short review cycle does not align with the standard academic practice, where, for instance, ABET reviews are typically conducted every five years. • As highlighted by President Gee [Evidence A], our department is also facing the effects of a declining high school student population, a reduced college-going rate, and an increasingly competitive market. Particularly, the Electrical Engineering program is experiencing the impact of national trends in declining student interest. Despite these challenges, LCSEE remains committed to finding innovative solutions to maintain academic excellence and provide quality education to our students. We continue to seek opportunities to optimize resources and enhance the overall efficiency of our programs. List of Evidence Files: • Evidence A Gee outlines vision for WVU's future as a modern land-grant university | WVU Today | West Virginia U • Evidence B Research | Lane Department of Computer Science and Electrical Engineering | West Virginia University: Research clusters for LCSEE • Evidence C CSEE_SCHs_Fall2019_Spring23: SCH trends and SCH/ faculty ration by LCSEE Major • Evidence D CSEE - Teaching Area Faculty: Calculated number for teaching efforts by LCSEE major • Evidence E Academic Transformation Public Data Table_July 10 2023 • Evidence F FY22ResExps_3yrHistory: Research Expenses over three years • Evidence G BSEE CS CpE BSE CYBE Curriculum: Sharing courses shared among LCSEE degree programs • Evidence H CS 101 Statistics: Trends in resources and enrollment for CS 101 • Evidence I New Labs and paper: Tanner and Morey Lab and ASEE paper for CpE 435 hands-on using smart grid lab • Evidence J Senior Design News and Paper: EcoCar, Mars Rover and Conference paper resulting from SEL sponsored senior design work • Evidence K WVU's cybersecurity program redesignated as National Center of Excellence by US National Security Ag • Evidence L LCSEE_Workload_Policy March 2023: Workload policy for LCSEE faculty • Evidence M 202308 - Course Schedule: For Fall 2023 • Evidence N LCSEE response to BOG review – 7 files

Q7.2. You may use this section to provide any additional evidence referenced in the program review.

Evidence C D H M.zip
351KB
application/zip

Q7.3. You may use this section to provide any additional evidence referenced in the program review.

Evidence N UG.zip
156.8KB
application/zip

Q7.4. You may use this section to provide any additional evidence referenced in the program review.

Q8.1.
Thank you for completing your self-study for the West Virginia University Board of Governors program review.
You may now submit the survey and your self-study will be passed on to the Provost's Office for review.

Location Data

Location: ████████████

Source: GeoIP Estimation