ENGINEERING ACCREDITATION COMMISSION

Summary of Accreditation Actions

2020–2021 Accreditation Cycle

Bucknell University
Lewisburg, PA, United States

Biomedical Engineering (B.S. in Biomedical Engineering)
Chemical Engineering (B.S. in Chemical Engineering)
Civil Engineering (B.S. in Civil Engineering)
Computer Engineering (B.S. in Computer Engineering)
Computer Science and Engineering (BS Comp Sci and Engineering)
Electrical Engineering (B.S. in Electrical Engineering)
Environmental Engineering (B.S. in Environmental Engineering)
Mechanical Engineering (B.S. in Mechanical Engineering)

Accredit to September 30, 2027. A request to ABET by January 31, 2026 will be required to initiate a reaccreditation evaluation visit. In preparation for the visit, a Self-Study Report must be submitted to ABET by July 1, 2026. The reaccreditation evaluation will be a comprehensive general review.

ABET

ENGINEERING ACCREDITATION COMMISSION

BUCKNELL UNIVERSITY

LEWISBURG, PA, UNITED STATES

FINAL STATEMENT OF ACCREDITATION

2020-21 ACCREDITATION CYCLE

BUCKNELL UNIVERSITY

Lewisburg, PA, United States

ABET ENGINEERING ACCREDITATION COMMISSION

FINAL STATEMENT

VISIT DATES: DECEMBER 6-8, 2020
ACCREDITATION CYCLE CRITERIA: 2020-2021

INTRODUCTION & DISCUSSION OF STATEMENT CONSTRUCT

The Engineering Accreditation Commission (EAC) of ABET has evaluated the Biomedical Engineering (B.S. in Biomedical Engineering), Chemical Engineering (B.S. in Chemical Engineering), Civil Engineering (B.S. in Civil Engineering), Computer Engineering (B.S. in Computer Engineering), Computer Science and Engineering (BS Comp Sci and Engineering), Electrical Engineering (B.S. in Electrical Engineering), Environmental Engineering (B.S. in Environmental Engineering), and Mechanical Engineering (B.S. in Mechanical Engineering) programs at Bucknell University.

The Computer Science and Engineering program was jointly reviewed by the Computing Accreditation Commission and the Engineering Accreditation Commission. Because each Commission has unique General and Program Criteria against which the joint program was examined for compliance, each Commission will report the results of the review in separate Draft and Final Statements to the institution and will independently determine an action. Normally, the more severe of the actions voted will be the action for the program.

The statement that follows consists of two parts: the first addresses the institution and its overall educational unit, and the second addresses the individual programs.

A program's accreditation action is based upon the findings summarized in this statement. Actions depend on the program's range of compliance or non-compliance with the criteria. This range can be construed from the following terminology:

- **Deficiency** A deficiency indicates that a criterion, policy, or procedure is not satisfied. Therefore, the program is not in compliance with the criterion, policy, or procedure.

- **Weakness** A weakness indicates that a program lacks the strength of compliance with a criterion, policy, or procedure to ensure that the quality of the program will not be compromised. Therefore, remedial action is required to strengthen compliance with the criterion, policy, or procedure prior to the next review.

- **Concern** A concern indicates that a program currently satisfies a criterion, policy, or procedure; however, the potential exists for the situation to change such that the criterion, policy, or procedure may not be satisfied.

- **Observation** An observation is a comment or suggestion that does not relate directly to the current accreditation action but is offered to assist the institution in its continuing efforts to

improve its programs.

INFORMATION RECEIVED AFTER THE REVIEW

- **Seven-Day Response** Information was received in the seven-day response period relative to the Computer Engineering program.

- **30-Day Due-Process Response** Information was received in the 30-day due-process response period relative to the Civil Engineering, Computer Engineering, and Electrical Engineering programs.

INSTITUTIONAL SUMMARY

Bucknell University is a private, nonsectarian, coeducational university comprised of three colleges which enroll 3,724 undergraduate students supported by over 360 faculty members. The College of Engineering enrolls 689 undergraduate students supported by 71 faculty members, and offers programs in Biomedical, Civil, Chemical, Computer, Electrical, Environmental, and Mechanical Engineering, as well as Computer Science and Engineering. The eight programs under review collectively produced 164 graduates in the 2019-20 academic year.

The following units were reviewed and found to adequately support the engineering programs: biology, chemistry, physics, mathematics, computing & information technology services, admissions, career services, institutional research and assessment, safety, the library, and the registrar.

INSTITUTIONAL STRENGTHS

1. The College of Engineering's Strategic Plan, "Engineering a Better World by Way of Bucknell," provides an outstanding framework upon which several innovative initiatives have been built. Its thorough yet concise capture of crucial core values and goals sets it apart from similar documents in academia. It is a source of clear direction that will ensure Bucknell's programs have a roadmap to continuous improvement for years to come.

2. Bucknell's engineering programs have effectively and intentionally incorporated exceptional laboratory facilities and experiences into their curricula and student research opportunities. The benefit of this approach is further enhanced by small lab section sizes and extensive student-faculty interactions. The magnitude of such hands-on student experience is remarkable and notable at the undergraduate level. This lab experience in all programs greatly improves student learning and significantly enhances the quality of engineering education provided by the institution.

Biomedical Engineering

B.S. in Biomedical Engineering Program

Evaluated under EAC Program Criteria for
Bioengineering and Biomedical and Similarly Named Engineering Programs

INTRODUCTION

The Biomedical Engineering (B.S. in Biomedical Engineering) program in the Department of Biomedical Engineering admitted 24 freshmen for the 2019-20 academic year. The program has 77 full-time students, served by six tenured/tenure-track faculty members and two staff members. The program produced 20 graduates in the 2019-20 academic year.

PROGRAM STRENGTH

The program benefits from a new building which includes 12 fully-equipped teaching laboratories. These resources are exceptional for a program of this size. The new facilities provide an outstanding environment that greatly enhances student learning.

PROGRAM OBSERVATION

The program would benefit by establishing an external advisory board, including members who are not Bucknell alumni, in order to obtain diverse perspectives from the multiple sectors that employ its graduates.

No deficiencies, weaknesses, or concerns were found.

Chemical Engineering

B.S. in Chemical Engineering Program

Evaluated under EAC Program Criteria for
Chemical, Biochemical, Biomolecular and Similarly Named Engineering Programs

INTRODUCTION

The Chemical Engineering (B.S. in Chemical Engineering) program is offered by the Department of Chemical Engineering. Four optional concentrations are offered: Biological, Environmental, Materials, and Process. The program currently enrolls 112 full-time students and is administered by 15 tenured/ tenure- track faculty members (13 full- time and two part- time) and two staff members. The program produced 18 graduates in the 2019-20 academic year.

PROGRAM OBSERVATION

The program would benefit by establishing an external advisory board, including members who are not Bucknell alumni, in order to obtain diverse perspectives from the multiple sectors that employ its graduates.

No deficiencies, weaknesses, or concerns were found.

Civil Engineering

B.S. in Civil Engineering Program

Evaluated under EAC Program Criteria for
Civil and Similarly Named Engineering Programs

INTRODUCTION

The Civil Engineering (B.S. in Civil Engineering) program is administered by the Department of Civil and Environmental Engineering. The program currently enrolls 98 full-time students and is supported by 14 full-time tenured/tenure-track faculty members, one full-time visiting assistant professor, one full-time non-teaching faculty as an Associate Dean, and two staff members. The program produced 29 graduates in the 2019-20 academic year.

PROGRAM STRENGTH

The program benefits from a full-time Director of Civil Engineering Laboratories who has the education, skills, and experience to maintain the facilities and equipment that are key to providing notable hands-on laboratory experiences to the students. The Director is responsible for multiple laboratory spaces, ensuring compliance with health and safety requirements; operating, maintaining, repairing, and replacing equipment and instrumentation; maintaining materials and supplies inventories; training; and assisting students and faculty members with the setup and conduct of laboratories. In addition, the Director's experience in machining provides the program and the department with the capacity to fabricate specialty apparatus that further support academic and research projects. A full-time director is unusual for small programs and enhances the quality of engineering education received by the students in the program.

PROGRAM WEAKNESS

Criterion 2. Program Educational Objectives

This criterion requires that the program have a systematically utilized and effective process, involving program constituencies, for the periodic review of the program educational objectives that ensures they remain consistent with the program's constituents' needs. The program's three constituency groups are its faculty members, program alumni, and its external Department Advisory Board. The program's documentation indicated that the current program educational objectives were adopted in June 2012, and then reaffirmed in April 2016 and again in March 2019. However, the reviews of the program educational objectives in 2016 and 2019 did not involve the alumni and the advisory board constituency groups. Without involving all of its constituencies in the review of program educational objectives, the program cannot ensure that those objectives are consistent with the needs of all of its constituencies. Thus, the program lacks strength of compliance with this criterion.

30-Day Due-Process Response

The EAC acknowledges receipt of documentation that the program has taken action to ensure all of its constituency groups are involved in a systematic and effective process to periodically review its program educational objectives. The program has modified its process to now require all constituency groups to review the objectives in the second and fifth years of the six- year accreditation cycle. The program demonstrated that all constituency groups reviewed and approved the program educational objectives in the spring of 2021 and that the planned review cycle involving all constituency groups will commence during the 2021-22 academic year.

Status

The program weakness has been resolved.

PROGRAM OBSERVATION

The program would benefit by augmenting its existing Department Advisory Board with additional members who are not Bucknell alumni in an effort to broaden the perspectives offered by the board.

Computer Engineering

B.S. in Computer Engineering Program

Evaluated under EAC Program Criteria for
Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs

INTRODUCTION

The Computer Engineering (B.S. in Computer Engineering) program is offered by the Department of Electrical and Computer Engineering. The program currently enrolls 44 full-time students and is administered by two full-time tenured/tenure track faculty members, one full-time-equivalent term faculty member (two full- time term faculty members shared with the Electrical Engineering program), and one full-time-equivalent staff member (two staff members shared with the Electrical Engineering program). The program produced 11 graduates in the 2019-20 academic year.

PROGRAM WEAKNESS

Criterion 4. Continuous Improvement

This criterion requires that the program regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. It further requires that the results of these evaluations be systematically utilized as input for the program's continuous improvement actions. The program uses a mix of data for assessing each student outcome and uses the evaluations of those assessments as input for continuous improvement. Information obtained from faculty interviews and display materials indicates there is a process to assess the attainment of student outcomes, and the data are used in the continuous improvement process. However, the process is not fully documented. Without a fully documented process to assess and evaluate the attainment of student outcomes, the program's ability to pursue continuous improvement is hampered. Therefore, the program lacks strength of compliance with the criterion.

30-Day Due-Process Response

The EAC acknowledges receipt of documentation indicating that the program's continuous improvement process has been documented in its ECE ABET Reference Handbook since at least 2013, although some of the information was out of date. The program has revised the handbook, which now accurately documents the program's processes for assessing and evaluating the extent to which student outcomes are attained and for systematically utilizing results as input to continuous improvement actions. In addition, procedures are now in place to archive the results and conclusions from its evaluations in an annual summary that will capture associated programmatic changes.

Status

The program weakness has been resolved.

PROGRAM CONCERNS

1. **Criterion 2. Program Educational Objectives**

   This criterion requires that the program have a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review of the program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and the engineering accreditation criteria. One listed constituency is the Bucknell Engineering Alumni Association (BEAA). Neither the program nor the college have input on the composition of the BEAA which is organized around a self-appointed board and a fluctuating membership consisting of whomever attends its annual meetings. Few graduates from the program have attended the annual BEAA meeting in the past six years and therefore the program may not be receiving representative input as to whether the PEOs meet the needs of this constituency. While the criterion is currently satisfied, it is possible that without systematic, representative feedback the program educational objectives may not continue to meet the needs of all program constituents. Therefore, the potential exists that this criterion may not be satisfied in the future.

30-Day Due-Process Response

The EAC acknowledges receipt of documentation indicating that the program plans to work with the College of Engineering to build a strong advisory board prior to the next review. However, no actions have yet been taken to ensure that the program receives representative input from the BEAA or to establish a program-specific external advisory board.

Status

The program concern is unresolved.

2. **Criterion 6. Faculty**

   This criterion requires the program to demonstrate that the faculty members are of sufficient number and that they have competencies to cover all of the curricular areas of the program. It further requires sufficient faculty to accommodate adequate levels of student- faculty interaction, student advising and counseling, university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students. Information obtained from faculty interviews and the Self-Study Report indicates that the program's two faculty members are currently teaching full loads. Although this criterion is currently satisfied, if additional faculty members cannot be added and if the trend of increasing enrollment continues, the program may not be able to provide adequate levels of student- faculty interaction and student advising, offer the necessary courses, and

ensure its faculty members have sufficient time to pursue professional development. Therefore, the potential exists that this criterion may not be satisfied in the future.

Seven-Day Response

The EAC acknowledges having received information from the institution confirming that none of the program's faculty members were overloaded (as defined by Bucknell University policy) during the review period. The faculty members are teaching full loads. A reference to overloaded faculty members that was previously included in the Program Audit Form has been removed from this statement.

30-Day Due-Process Response

The EAC acknowledges receipt of documentation indicating that the program has submitted a request to Bucknell's Committee on Staff Planning for two additional tenure- track faculty positions. However, no action has been taken thus far to increase the number of faculty members supporting the program.

Status

The program concern is unresolved.

PROGRAM OBSERVATION

The program would benefit by establishing an external advisory board, including members who are not Bucknell alumni, in order to obtain diverse perspectives from the multiple sectors that employ its graduates.

Computer Science and Engineering

BS Comp Sci and Engineering Program

Evaluated under EAC Program Criteria for
Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs

INTRODUCTION

The Computer Science and Engineering (BS Comp Sci and Engineering) program is offered by the Department of Computer Science. The program currently enrolls 92 full-time students and is administered by 12 full-time tenured/tenure-track faculty members, two full-time visiting faculty members, one full-time staff member, and two additional staff members shared with the College of Engineering. The program produced 27 graduates in the 2019-20 academic year.

No deficiencies, weaknesses, or concerns were found.

Electrical Engineering

B.S. in Electrical Engineering Program

Evaluated under EAC Program Criteria for
Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs

INTRODUCTION

The Electrical Engineering (B.S. in Electrical Engineering) program is offered by the Department of Electrical and Computer Engineering. The program currently enrolls 56 full-time students and is administered by six full-time tenured/tenure-track faculty members, one full-time equivalent term faculty member (two full- time term faculty members shared with the Computer Engineering program), and one full-time equivalent staff member (two staff members shared with the Computer Engineering program). The program produced 15 graduates in the 2019-20 academic year.

PROGRAM WEAKNESS

Criterion 4. Continuous Improvement

This criterion requires that the program regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. It further requires that the results of these evaluations be systematically utilized as input for the program's continuous improvement actions. The program uses a mix of data for assessing each student outcome and uses the evaluations of those assessments as input for continuous improvement. There is a process to assess the attainment of student outcomes and the data are used in the continuous improvement process. However, the process is not fully documented. Without a fully documented process to assess and evaluate the attainment of student outcomes, the program's ability to pursue consistent continuous improvement is greatly hampered. Therefore, the program lacks strength of compliance with the criterion.

30-Day Due-Process Response

The EAC acknowledges receipt of documentation indicating that the program's continuous improvement process has been documented in its ECE ABET Reference Handbook since at least 2013, although some of the information was out of date. The program has revised the handbook, which now accurately documents the program's processes for assessing and evaluating the extent to which student outcomes are attained and for systematically utilizing results as input to continuous improvement actions. In addition, procedures are now in place to archive the results and conclusions from its evaluations in an annual summary that will capture associated programmatic changes.

Status

The program weakness has been resolved.

PROGRAM CONCERN

Criterion 2. Program Educational Objectives

This criterion requires that the program have a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review of the program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and the engineering accreditation criteria. One listed constituency is the Bucknell Engineering Alumni Association (BEAA). Neither the program nor the college have input on the composition of the BEAA which is organized around a self- appointed board and a fluctuating membership consisting of whomever attends its annual meetings. Few graduates from the program have attended the annual BEAA meeting in the past six years and therefore the program may not be receiving representative input as to whether the PEOs meet the needs of this constituency. While the criterion is currently satisfied, it is possible that without systematic, representative feedback the program educational objectives may not continue to meet the needs of all program constituents. Therefore, the potential exists that this criterion may not be satisfied in the future.

30-Day Due-Process Response

The EAC acknowledges receipt of documentation indicating that the program plans to work with the College of Engineering to build a strong advisory board prior to the next review. However, no actions have yet been taken to ensure that the program receives representative input from the BEAA or to establish a program-specific external advisory board.

Status

The program concern is unresolved.

PROGRAM OBSERVATION

The program would benefit by establishing an external advisory board, including members who are not Bucknell alumni, in order to obtain diverse perspectives from the multiple sectors that employ its graduates.

Environmental Engineering

B.S. in Environmental Engineering Program

Evaluated under EAC Program Criteria for
Environmental and Similarly Named Engineering Programs

INTRODUCTION

The Environmental Engineering (B.S. in Environmental Engineering) program is offered by the Department of Civil and Environmental Engineering. The program currently enrolls 45 full-time students and is administered by 14 full-time tenured/tenure-track faculty members, one full-time visiting assistant professor, one full-time non-teaching faculty member as an Associate Dean, and two staff members. The program produced six graduates in the 2019-20 academic year.

PROGRAM STRENGTH

The Environmental Engineering and Science Laboratory is led by a full-time Laboratory Director with 15 years of industrial laboratory experience, and who has the education, skills, and experience necessary to maintain the facilities and equipment that are key to providing notable hands-on laboratory experiences to the students. The Director is responsible for training students; calibrating, maintaining, repairing, and replacing equipment and instrumentation; maintaining a supply inventory; assisting faculty members with laboratory setup; and ensuring compliance with health and safety requirements. A full-time dedicated resource such as this is unusual for small programs and provides an excellent student lab learning experience.

PROGRAM OBSERVATION

The program would benefit by augmenting its existing Department Advisory Board with additional members who are not Bucknell alumni in an effort to broaden the perspectives offered by the board.

No deficiencies, weaknesses, or concerns were found.

Mechanical Engineering

B.S. in Mechanical Engineering Program

Evaluated under EAC Program Criteria for
Mechanical and Similarly Named Engineering Programs

INTRODUCTION

The Mechanical Engineering (B.S. in Mechanical Engineering) program is offered by the Department of Mechanical Engineering. The program currently enrolls 167 full-time students and is administered by 17 tenured/tenure-track faculty members (14 full-time and three part-time) and two staff members. The program produced 38 graduates in the 2019-20 academic year.

PROGRAM OBSERVATION

The program would benefit by establishing an external advisory board, including members who are not Bucknell alumni, in order to obtain diverse perspectives from the multiple sectors that employ its graduates.

No deficiencies, weaknesses, or concerns were found.