

2023 – 2024 Bluffton to WSU Undergraduate Programs Advising Guide

Department of Electrical Engineering
Wright State University
Dayton, Ohio 45435

Adopted from the Undergraduate Programs Advising Guide (March 14, 2020).

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Bachelor of Science in Electrical Engineering (BSEE)

The BSEE program requires 120 semester hours of course work from math, science, engineering, WSU Core, technical and general electives.

Admission Requirements

All CECS major programs require that students meet the following specifications:

- Completion of 24 or more semester hours of college-level work
- 2.25 cumulative GPA at Wright State and in all academic work
- C or higher in: ENG 1100 (or any Wright State Core first-year writing course)

(Expected change to the above) BSEE majors must also complete: EE 1000, EE 2000/2000L, EE 2010/2010L, MTH 2300, MTH 2310, MTH 2320 or MTH 2350, CHM 1210/1210L or BIO 1120/1120L or BIO 1150/1150L, PHY 2400/2400L, PHY 2410/2410L, CS 1160 or CS 1180 or CEG 2170, and 3 hours of integrated writing in WSU Core beyond ENG 1100.

ABET Accrediting Requirements

To satisfy accreditation requirements of the Engineering Accrediting Commission (EAC) of ABET, the BSEE program includes ¹:

- a. a minimum of 30 semester credit hours (or equivalent) of a combination of college-level mathematics and basic sciences with experimental experience appropriate to the program.
- b. a minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design, and utilizing modern engineering tools.
- c. a broad education component that complements the technical content of the curriculum and is consistent with the program educational objectives.
- d. a culminating major engineering design experience that 1) incorporates appropriate engineering standards and multiple constraints, and 2) is based on the knowledge and skills acquired in earlier course work.

The BSEE program includes 16 hours of calculus, 10 hours of physics, and at least 4 hours of additional science. Science courses are restricted to chemistry, biology, and physical sciences per EAC criteria. Also, EE pre-major and full-major courses provide more than 45 hours of engineering topics. WSU Core Elements 1, 3, 4, and 5 provide a broad educational complement of non-technical content, and the two-semester Senior Design capstone provides a culminating major engineering design experience. Note, however, WSU Core imposes minor constraints on course selection. It is important to keep in mind that each graduation plan must satisfy both ABET accreditation and WSU Core requirements.

Wright State Core Requirements

The WSU Core requirements and program considerations are described below.

Element 1. One first-year writing course (3 hr) and one second-year writing course (3 hr). BSEE requires ENG 1100 and EGR 3350 Technical Communications (or ENG 2140 Technical Writing with a preference for EGR 3350).

Element 2. One Core math course (minimum of 3 hrs) as satisfied by MTH 2300.

Element 3. One interdisciplinary Global Studies course (3 hr) and one history course (3 hr). The history courses are limited by WSU Core. Due to the additional requirements of integrated writing and multicultural competency (described below), students are advised to select a Global Studies course that satisfies both IW and MC requirements.

¹ ABET EAC accreditation criteria for 2023-2024: <https://www.abet.org/accreditation/accreditation-criteria/accreditation-policy-and-procedure-manual-appm-2023-2024/>

Element 4. One course from arts/humanities (minimum of 3 hrs). Due to the additional requirements of integrated writing and multicultural competency (described below), students are advised to select a Global Studies course that satisfies both IW and MC requirements.

Element 5. Two courses from different social science categories. Although not required, students are advised to select an economics course for its relevance to engineering. Students may choose two non-economics courses.

Element 6. Two lecture/lab science courses (minimum of 8 hrs) as satisfied by PHY 2400/L and PHY 2410/L.

Additional Core. Two Core courses from any of the Elements (minimum of 6 hrs). In some of the WSU documentation, the language states that the two courses must be from different elements while in other documentation the requirement is ambiguous². The BSEE program assumes the more restrictive interpretation. MTH 2310 satisfies one Additional Core course and students are directed to complete the second Additional Core course in chemistry or biology to complete ABET math and science requirements. At this time, WSU Core Element 6 does not include physics courses beyond PHY 2400/L and PHY 2410/L. A program plan that includes a third course in Physics beyond PHY 2400/L and PHY 2410/L and of at least 4 hours satisfies ABET requirement. However, the program will require another WSU Core course in an area other than math.

Integrated Writing (IW). Any two Core courses designated as IW. Students are advised to select IW courses when choosing from Elements 3, 4 and 5.

Multicultural Competency (MC). Students must take any two courses designated as MC, SRV (Service Learning) or SRVI (Service Learning Intensive) or requiring an approved study abroad component. Students are advised to select MC courses from Elements 3, 4 and 5.

An example of a 4-year plan is provided in Section **Example BSEE Graduation Plan Worksheet**.

Computer Programming

The BSEE program includes 4 hours of computer programming. The ideal programming languages are C (CEG 2170) and C++ (CEG 2170). However, the Department of Computer Science and Engineering (CSE) is currently unable to ensure regular offerings of C/C++. For this reason, in 2019, the EE faculty approved a change to allow CS 1160/L, CS 1180/L or CEG 2170/L. Students are advised to take CS 1180/L or CS 1160/L with emphasis on CS 1180/L. As a Java-based programming course, the language has similar syntax to C/C++ and is likely to have greater availability due to its requirement in CS, CEG and CET programs. Although it is unlikely, students who have a computer programming course from a language other than C/C++, Java, or python may petition the Student Affairs Committee to substitute the course for one of the above courses.

Technical Electives

The Department approved technical electives are broadly stated as:

2000+ level courses from College of Engineering and Computer Science, or College of Science and Math, or College of Business. Science courses must be natural or physical science courses. Students may take one of the following 1000-level courses: EGR1010, MTH1350, CS1161, CS1181, or ME1020. Redundant coursework (e.g. ISE 2211, MS 2040, STT 3630, STT 2640) will not be accepted. Technical electives may include 1 semester hour of internship credit (EE4810, EE4820, or EE4830), and may include 3 hours of study abroad (EGR4980) with department approval.

The 1000-level courses include engineering math and programming preparation courses (EGR 1010, MTH 1350, ME 1020), and programming courses that continue in the students' selected computer programming sequence.

Study abroad courses must be approved by the EE Department before registration of the course. Each study abroad course has a unique syllabus and travel itinerary. Typically, EE faculty will review the course syllabus to verify that the course includes substantive content of electrical engineering. Students will not receive Technical Elective credit for EGR 4980 unless the approval occurs before the course begins.

² WSU Core. <https://www.wright.edu/academic-affairs/programs/general-education/program-requirements>

Senior Design

Senior Design I (EE 4910) and II (EE 4920) constitute the major engineering experience in the BSEE program. Prerequisites are required for registration and include EE 3210, EE 3310/L, EE 3260, EE 3450/L and at least one 4000-level course. In cases when the graduation date is within one year and the graduation plan is only missing one course, the student may petition to take the missing course concurrently with EE 4910.

Bachelor of Science in Electrical Engineering – Bluffton Transfer Pathway (BSEE-Bluffton)

The transfer pathway from the Bluffton program in pre-Engineering to the WSU BSEE program differs from the BSEE program by way of the Ohio Transfer 36 and the Department approval for Senior Design.

Students who complete the General Education courses as part of the Bluffton program may satisfy WSU Core courses. The pathway also requires math and science courses and hours that meet ABET requirements; and students must complete the same math and science options as students in the 4-year BSEE program,

Under this agreement, the Department automatically approves concurrent enrollment in EE 3260 and EE 4910. An example of a 4-year plan is provided in Section **Example Bluffton Pre-Engineering to BSEE Graduation Plan Worksheet**.

Name: _____ UID: _____ Reviewed by: _____ Date: _____

Directions:

Refer to the Bluffton Catalog for the General Education Requirements and Pre-Engineering coursework, the WSU Catalog, and the BSEE Program description. Create a list of courses by term. Meet with a program advisor to review the graduation plan at the start of the program and periodically throughout to make sure all courses satisfy requirements for Wright State University, the College of Computer Science and Engineering, and the Department of Electrical Engineering. The model below is a 4-year plan for a student who begins without prior college credit.

Bluffton University and Wright State University have entered into an Academic Pathway for a student to complete two full-time years of general education and pre-engineering coursework at Bluffton University and two full-time years at Wright State University.

- An 8-semester (plus an additional summer semester) Academic Pathway listing the courses to take at Bluffton University and at Wright State University will be posted on each institution's Transfer website.
- The 8 semesters, plus an additional summer semester, (with approximately 15 hours each semester) are divided into 4 semesters (plus a summer semester) at Bluffton University (total of 69 hours) and 4 semesters at Wright State University (total of 57 hours). The pathway satisfies WSU Core and ABET criteria.
- The Academic Pathway lists important transfer information specific to the major at Wright State University. Examples are major specific admissions requirements, such as minimum GPA, pre-requisite courses, and application deadlines.
- The Academic Pathway lists the contact information at both institutions.
- Any variation from taking the listed courses in the specified semesters may impact a student's completion of the Academic Pathway in 8 semesters (plus a summer semester).
- Course availability is subject to enrollment capacity.

Students complete 69 hours at Bluffton University during the first two years which transfer according to the listings for Years 1 and 2 below. Then, students complete 57 hours at Wright State to complete the BSEE program. The example course outline is shown for Years 3 and 4.

Year 1. BSEE pre-major. Beginning math, science, electrical engineering, and WSU Core. Courses are generally available fall and spring.

| Bluffton University | | | | Transfer Equivalent | | | |
|------------------------|------------------------|---|--------------|---------------------|---------------------------|--|--------------|
| SUBJECT CODE | COURSE NUMBER | COURSE TITLE | CREDIT HOURS | SUBJECT CODE | COURSE NUMBER | COURSE TITLE | CREDIT HOURS |
| FALL SEMESTER | | | | | | | |
| BENV | 100 | Becoming a Scholar | 3 | UNK | 1XXX | Non-Equivalent Transfer Course General Elective Credit | 3 |
| CPS | 108 | Computer Programming | 3 | CS | 1160 | Intro to C Programming for Engineers | 3 |
| MAT | 135 | Calculus I | 5 | MTH | 2300 | Calculus I (plus General Elective Credit) WSU Core Element 2 | 5 |
| PHY | 150 | Engineering Seminar | 1 | EE | 1000 | Intro. to Electrical Engineering | 1 |
| PHY | 211 | Physics for Science/Engineering I | 5 | PHY | 2400/2400L | General Physics I WSU Core Element 6 | 5 |
| SPRING SEMESTER | | | | | | | |
| CMP | 110 | College English | 3 | ENG | 1100 | Academic Writing and Reading WSU Core Element 1 | 3 |
| MAT | 136 | Calculus II | 5 | MTH | 2310 | Calculus II (plus General Elective Credit) WSU Core Additional Core Course | 5 |
| MAT | 225 | Multivariate Calculus | 3 | MTH | 2320 | Calculus III | 3 |
| PHY | 212 | Physics for Science/Engineering 2 | 5 | PHY | 2410/2410L | General Physics II WSU Core Element 6 | 5 |
| SUMMER SEMESTER | | | | | | | |
| ART MUS THE | 135, 136, or 135 | Introduction to Visual Arts World Music Introduction to Theatre | 3 | ART MUS TH | 2140, 2420, or 2140 | Themes in Visual Culture Music in Western Culture Theatre in Western Culture WSU Core Element 4 | 3 |
| Total Hours: | | | 36 | Total Hours: | | | 36 |

Year 2. BSEE pre-major and beginning full-major. Math, science, electrical engineering, and WSU Core. Courses are generally available fall and spring.

| Bluffton University | | | | Transfer Equivalent | | | |
|--|--|---|--------------|---------------------------------------|--|---|--------------|
| SUBJECT CODE | COURSE NUMBER | COURSE TITLE | CREDIT HOURS | SUBJECT CODE | COURSE NUMBER | COURSE TITLE | CREDIT HOURS |
| FALL SEMESTER | | | | | | | |
| BENV | 200 | Learning in Community | 5 | UNK | 2XXX | Non-Equivalent Transfer Course General Elective Credit | 5 |
| CEM | 121 | General Inorganic Chemistry I | 5 | CHM | 1210/1210L | General Chemistry I and Lab WSU Core Additional Core Course | 5 |
| ECN PLS PLS PSY SOC SOC | 141, 100, 251, 110, 152, or 162 | Principles of Macroeconomics Introduction to Political Science American Political Process Introduction to Psychology Anthropology | 3 | EC PLS PLS PSY SOC ATH | 2050, 2000, 2120, 1010, 2000, or 1XXX | Principles of Macroeconomics Power and Politics American National Government Introduction to Psychology Introduction to Sociology Non-Equivalent Transfer Course WSU Core Element 5 | 3 |
| REL | 115 | World Religions | 3 | REL | 2320 | Non-Western Religions WSU Core Element 3 | 3 |
| SPRING SEMESTER | | | | | | | |
| HIS | 210, 212, or | World History 1 World History 2 | 3 | HST | 1010, or 1020 | Western Civilizations to 1500 The West and the World Since 1500 WSU Core Element 3 | 3 |
| MAT | 350 + 230 | Differential Equations Linear Algebra | 6 | MTH | 2350 | Differential Equations with Matrix Algebra (plus General Elective Credit) | 6 |
| PHY | 326 | Technical Electives (8 hours) Thermal/Modern/Nuclear/Quantum Physics | 5 | PHY | 3XXX | Technical Elective (8 hours) Non-Equivalent Transfer Course | 5 |
| PHY | 360 | Linear Electronics | 4 | PHY | 3150 | Physics Instrumentation (plus Gen- eral Elective Credit) | 4 |
| PHY | 365 | Electricity and Magnetism | 3 | PHY | 4500 | Electricity and Magnetism I | 3 |
| PHY | 370 | Quantum Mechanics | 3 | PHY | 4600 | Introduction to Quantum Mechan- ics I | 3 |
| PHY | 375 | Analytical Mechanics | 3 | PHY | 3710 | Analytical Mechanics | 3 |
| Total Hours: | | | 33 | Total Hours: | | | 33 |

Third and fourth years of Bluffton pre-Engineering to BSEE Program

Year 3. EE full-major. Advanced math, electrical engineering, and WSU Core. Courses are generally available fall and spring.

| Course | CR | WSU Core | Sem | Gr | Title (Prerequisites) |
|-----------|----|----------|-----|----|--|
| EE 2000/L | 4 | E1 | F | | Digital Design with HDL and Lab (enrolled in CECS) |
| EE 2010/L | 4 | | F | | Analog Circuit Theory and Lab (MTH 2300 minimum of C) |
| EE 3450/L | 4 | | F | | Intro Electromagnetics and Lab (EE 2010/L minimum of C, MTH 2320 and PHY 2410/L) |
| EGR 3350 | 3 | | F | | Technical Communications for Engineers and Computer Scientists (ENG 1100 minimum of D) |
| | | | F | | |
| EE 3210 | 3 | | S | | Continuous Linear Systems (EE 2010/L minimum of C and MTH 2310) |
| EE 3310/L | 4 | | S | | Elec. Devices & Circuits and Lab (EE 2010/L minimum of C and MTH 2300) |
| EE 4000 | 3 | | S | | Discrete Linear Systems (EE 2010/L minimum of C and MTH 2310) |
| EE 4620/L | 4 | | S | | Dig. Integrated Circuit Design with PLDs and FPGAs and Lab (EE 2000/L minimum of C) |
| | 29 | | | | Credit hours per semester in the model program: Fa (15), Sp (14) |

Year 4. EE full-major. Electrical engineering senior design and WSU Core. Courses are generally available fall and spring.

| Course | CR | WSU Core | Sem | Gr | Title (Prerequisites) |
|-----------|----|----------|-----|--|--|
| EE 3260 | 3 | E5 | F | | Random Signals and Noise (EE 4000 minimum of C and MTH 2350) |
| EE 4130/L | 4 | | F | | Continuous Control Systems and Lab (EE 3210 minimum of C and MTH 2310) |
| EE 4210/L | 4 | | F | | Digital Communication with Lab (EE 4000 minimum of C) |
| EE 4910 | 3 | | F | | Electrical Engr. Senior Design Project I (Department approval) |
| | 3 | | S | | WSU Core Element 5 (Social Science with MC and IW designations) |
| | 4 | S | | 4000-level EE course with lab, excludes EE4910/4920/4810/4820/4830 (see catalog) | |
| | 4 | S | | 4000-level EE course with lab, excludes EE4910/4920/4810/4820/4830 (see catalog) | |
| EE 4920 | 3 | S | | Electrical Engr. Senior Design Project II (Department approval) | |
| | 28 | | | | Credit hours per semester in the model program: Fa (14), Sp (14) |

1. ADMISSIONS AND DEADLINES

Transfer to Wright State University

Students must earn a minimum 2.0 GPA from Bluffton University in order to transfer to Wright State.

Wright State processes applications as they are received. To help you make a smooth and timely transition, we recommend you submit your application by the following dates:

Fall Semester: **April 1**
Spring Semester: **October 15**
Summer Semester: **February 1**

In order to be admitted fully as an electrical engineering major at Wright State, students will need to achieve a cumulative GPA of a 2.25. In addition, students will need to complete the following courses:

- At Bluffton: CMP 110 (C or higher) and MAT 135
- At Wright State: EE 2000/2000L

2. TUITION AND SCHOLARSHIPS

Students interested in scholarship opportunities at Wright State should contact:

Transfer Center
Student Union 138
3640 Colonel Glenn Hwy.
Dayton, OH 45435
937-775-5700
transfer@wright.edu

3. CONTACT INFORMATION

Bluffton University
*The Health Sciences, Natural Sciences
and Mathematics*
Centennial Hall 314
1 University Drive, Bluffton, OH
419-358-3294
harnishs@bluffton.edu

Wright State University
College of Engineering and Computer Science
280 Joshi Research Center
3640 Colonel Glenn Hwy.
Dayton, OH
937-775-5272
cecs-advisors@wright.edu

This agreement will expire two years from date of signature.



11/21/23

J. Alexander Sider, Ph.D.
Interim Vice President and Dean of Academic Affairs
Bluffton University

Date



11/21/23

Amy Thompson, Ph.D.
Provost and Senior Vice President for Academic Affairs
Wright State University

Date