

# Bachelor of Science in Cybersecurity Engineering

## B.S. in Cybersecurity Engineering

### Overview

Cybersecurity engineers identify threats and vulnerabilities in software, networks, and other systems. They apply their skills to design, develop, and implement high-tech solutions to defend against hacking, malware and ransomware, insider threats and all types of cyber crime. In addition to designing and developing safeguards, cybersecurity engineers continually monitor their systems and update them when necessary to prevent zero-day threats (from new and novel malware) and other emerging cybercriminal activity. For companies, cybersecurity engineers protect both information and the overall bottom line. Because of this, cybersecurity engineers are vital to the success of the organizations they serve.

### Educational Objectives

Graduates who have earned a Bachelor's Degree in Cybersecurity Engineering, within a few years following graduation, will have demonstrated technical proficiency, collaborative activities, and professional development.

#### Technical Proficiency

Graduates will have achieved success and visibility in their chosen careers as shown by technical accomplishments in industry, government, entrepreneurial activities, or academia.

#### Collaborative Activities

Graduates will have exercised shared responsibilities through activities such as contributions to multi-person or multi-disciplinary technical projects, participation in professional society/organization functions, or performing collaborative research. In all such cases, graduates will have contributed to documentation of the collaborative activities.

#### Professional Development

Graduates will have demonstrated continual updating to extend their expertise and adapt to a changing environment through graduate studies; short courses, conferences, and seminars; or professional self-study.

In addition, graduates will have demonstrated evidence of increasing technical and/or managerial impact.

## Undergraduate Admission to the School of Engineering

Admission to the KU School of Engineering and its degree programs is selective. Students may be admitted to an engineering or computer science degree program (<https://enr.ku.edu/admission-requirements/>) as freshmen (first-year) students, but all admissions, for both in-state and out-of-state students, are selective. Applications are judged on several factors, such as high school record, scores on national tests, academic record at college or university level, and trend of grades and more. High school transcripts are required.

## Freshman Admission Standards to the School of Engineering

To be considered for admission to the School of Engineering, beginning freshmen (first-year) students must meet or exceed the following minimum standards:

- Must be admissible (<https://admissions.ku.edu/major-specific-requirements/>) to the University of Kansas by assured admissions or individual review, **AND**
- Have a 3.0+ high school GPA, **AND**
- Demonstrate mathematics preparedness by:
  - Obtaining a mathematics ACT score of 22+ (or math SAT score of 540+), **OR**
  - Achieving a 'B' or better in 'college algebra' or a more advanced mathematics course, **OR**
  - Achieving a 'C' or better in a high school calculus course; **OR**
  - Earning credit via IB or AP credit for the above-mentioned courses in accordance with KU placement credit requirements; **OR**
  - Achieving at minimum a qualifying score for MATH 104 on the ALEKS mathematics placement exam.

### Pre-Engineering

Students not admitted directly to the School of Engineering and their department but who are admissible to the university may be admitted to the College of Liberal Arts and Sciences as an pre-engineering student. They can later re-apply to the School of Engineering during the semester they are completing the admission requirements for transfer students.

## Transfer Student Admission Standards to the School of Engineering

Applications from all transfer students, whether from other institutions or from other academic schools at the University of Kansas, are evaluated on a case-by-case basis. Transfer students must:

- Be admissible (<http://admissions.ku.edu/apply/requirements/ustransfer/>) to KU, **AND**
- Earn a cumulative college transferable grade-point average of 2.5+, **AND**
- Earn a grade of "C" or better in MATH 125 (Calculus I, or its direct equivalent), **AND**
- Earn grades of "C" or better in math, science, and engineering courses applicable to the engineering degree.

Students must also complete their last 30 hours of credit at KU (<http://policy.ku.edu/governance/FSRR/#art4sect5>).

## Current Student Admission Standards to the School of Engineering

Students who are currently enrolled at KU, need to meet the following:

- Earn a 2.5+ KU GPA, **AND**
- Earn a grade of "C" or better in MATH 125 or its direct equivalent, **AND**
- Earn a grade of "C" or better in all math, science, and engineering courses.

Current KU Students admitted to other academic units may apply to the School of Engineering by completing a Change of School form (<https://inowformsprivate.ku.edu/imagenowforms/fs/?form=OUR%20Change>

%20of%20School%20Form). Contact the engineering recruitment team (studyengineering@ku.edu) if you have any questions. Per University Registrar deadlines for processing, Change of School applications for the fall semester will be accepted until the last Friday in October of each school year; Change of School applications for the spring semester will be accepted until the last Friday in March of each school year.

## Already Applied to KU, But Not Engineering?

Don't worry. It's not too late to change your mind if you've already applied to KU and selected a major outside the School of Engineering. If you think one of the 12 engineering or computer science majors is a better fit for your talents, you can still change your requested major — preferably before May 1 — and be considered for admission to the School of Engineering and all the benefits that go with it.

To update your application, visit Undergraduate Admissions (<http://admissions.ku.edu/update-your-application/>) and click on “Change application term, major, mailing address, and/or email address.”

Please contact a member of our recruitment team (studyengineering@ku.edu), 785-864-3881, if you have any difficulty.

## Bachelor of Science in Cybersecurity Engineering Degree Requirements

Code	Title	Hours
<b>Core 34 General Education</b>		
Select courses to meet Core 34 General Education requirements.		27
<b>Basic Science</b>		
EPHX 210	General Physics I for Engineers	3
or PHSX 211	General Physics I	
or PHSX 213	General Physics I Honors	
Natural Science Elective		
Any course fulfilling Core 34 NPS totaling 4 credit hours. May be fulfilled with 3 credit hours of NLEC and 1 credit hour of NLAB.		4
<b>Mathematics</b>		
MATH 125	Calculus I (Core 34: Math and Statistics (SGE)) <sup>030</sup>	4
or MATH 145	Calculus I, Honors	
or MATH 115	Calculus I	
& MATH 116	and Calculus II	
MATH 126	Calculus II	4
or MATH 146	Calculus II, Honors	
MATH 127	Calculus III	4
or MATH 147	Calculus III, Honors	
MATH 290	Elementary Linear Algebra	2
or MATH 291	Elementary Linear Algebra, Honors	
EECS 210	Discrete Structures	4
EECS 461	Probability and Statistics	3
<b>Required Computing Courses</b>		
EECS 101	New Student Seminar	1
EECS 140	Introduction to Digital Logic Design	4
or EECS 141	Introduction to Digital Logic: Honors	
EECS 168	Programming I	4
or EECS 169	Programming I: Honors	
EECS 268	Programming II	4
EECS 330	Data Structures and Algorithms	4

EECS 348	Software Engineering I	4
EECS 388	Embedded Systems	4
EECS 581	Software Engineering II	3
EECS 678	Introduction to Operating Systems	4

### Required Cybersecurity Engineering Courses

EECS 465	Cyber Defense	3
EECS 563	Introduction to Communication Networks	3
EECS 565	Introduction to Information and Computer Security	3
EECS 569	Computer Forensics	3
EECS 677	Advanced Software Security Evaluation	3
EECS 695	Software Reverse Engineering	3

### Capstone Course

EECS 592	Cybersecurity Design	3
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### Cybersecurity Electives

CyE majors must choose 3 classes from the following list to fulfill CyE 9 elective requirements. Under unusual circumstances, other courses can be considered, but only with an accompanying petition.

EECS 665	Compiler Construction	
EECS 666	Introduction to Network Security	
EECS 677	Advanced Software Security Evaluation	
EECS 683	Introduction to Hardware Security and Trust	
EECS 685	Introduction to IoT Security (Same as EECS 700: IoT Security)	
EECS 687	Mobile Security (Same as EECS 700: Mobile Security)	
EECS 695	Software Reverse Engineering	
EECS 700	Special Topics: _____ (Biometric Authentication)	
EECS 755	Software Modeling and Analysis	
EECS 765	Introduction to Cryptography and Computer Security	
ENGR 360	Special Topics: _____ (Business for Engineers)	
POLS 687	Introduction to Cyber Intelligence	

### EECS Electives

Choose any 6 credit hours of EECS courses 400 or above, except EECS 498 and EECS 692. Only one of EECS 645 or EECS 643 may be used.

### Additional Math/Science Elective

CYEN majors are required to complete an additional math or science course (3 credit hours). Select one course from either of the following categories:

Natural Science: Any course fulfilling Core 34 NPS or NLEC with a minimum of 3 credit hours outside of the CyE Basic Science requirement. This must be in addition to Core 34: Natural and Physical Science requirement.

Math: Any MATH course numbered 200 and above that is not a degree requirement, except MATH 209, MATH 365, MATH 510, or MATH 526.

**Total Hours** **126**

### Course Prerequisites and Corequisites

Students must pass (with an appropriate grade) all prerequisite courses for a given course **before** taking the subsequent course. If Course A is a Corequisite for Course B, Course A must be taken in the same semester as Course B or be completed prior to taking Course B.

### Upper Level Eligibility

In addition to prerequisites and co-requisites, EECS undergraduates are required to earn **Upper Level Course Eligibility (ULE)** by attaining grades of C or better (C- does not qualify) in each of the following 13 courses:

Core 34: English (Both)

EPHX 210

MATH 125, 126, 127, 290

EECS 101, 140, 168, 210, 268, 348

If students earn less than a C in any of the above listed courses, they must repeat the course at the next available opportunity and must **not** take a course for which that course is a prerequisite. It is the *students' responsibility* to contact their advisors *before beginning the new semester* regarding any required repetitions and the associated enrollment adjustments (drops and adds).

To enroll in *any* upper#level EECS course beyond the ULE list, students must have fulfilled the **Upper Level Eligibility Requirements** detailed above. Exceptions: EECS 312, EECS 330, EECS 361, and EECS 388 may be taken in the same semester as students are completing their upper level eligibility. Students may also petition for a *Partial Waiver of Upper Level Eligibility Requirements* by completing the appropriate petition, found in the EECS office or at [www.eecs.ku.edu](http://www.eecs.ku.edu) (<http://www.eecs.ku.edu/>).

### Double Major

If students wish to double-major (earn two degrees), they must fulfill all the requirements for the degrees in question. They must also consult the Engineering Dean's office and the department and/or school of the second major to find out if there are any additional requirements. If they wish to obtain two degrees offered by the EECS department, the following rule applies: a course that is required for one EECS degree program may not be used to satisfy a Senior Elective or General Elective requirement of another EECS degree program.

### Freshman

Fall	Hours Spring	Hours
EECS 101	1 EECS 140	4
EECS 168	4 MATH 126	4
MATH 125 (Core 34: Math and Statistics (SGE)) <sup>030**</sup>	4 EECS 268	4
Core 34: English (SGE) <sup>010</sup>	3 Core 34: English (SGE) <sup>010</sup>	3
Core 34: Communications (SGE) <sup>020</sup>	3 Natural and Physical Science Elective	3
	<b>15</b>	<b>18</b>

### Sophomore

Fall	Hours Spring	Hours
MATH 127	4 MATH 290	2
EECS 210	4 EECS 330	4
EPHX 210 (Core 34: Natural and Physical Sciences (SGE)) <sup>040*</sup>	3 EECS 388	4
PHSX 216 (Core 34: Natural and Physical Sciences (SGE)) <sup>040*</sup>	1 Core 34: US Culture (SGE) <sup>070</sup>	3

EECS 348	4 Core 34: Social and Behavioral Science (SGE) <sup>050</sup>	3
	<b>16</b>	<b>16</b>

### Junior

Fall	Hours Spring	Hours
EECS 461	3 EECS 563	3
EECS 465	3 EECS 565	3
EECS 678	4 EECS Elective 1	3
PHIL 375 (Core 34: Arts and Humanities (SGE)) <sup>060**</sup>	3 Add. Math/Science Elective <sup>2</sup>	3
Core 34: Arts and Humanities (SGE) <sup>060</sup>	3 Core 34: Global Culture (SGE) <sup>070</sup>	3
	<b>16</b>	<b>15</b>

### Senior

Fall	Hours Spring	Hours
EECS 581	3 EECS 592 (Capstone)	3
EECS 569	3 EECS 695	3
EECS 677	3 CyE Elective 2	3
EECS Elective 2	3 CyE Elective 3	3
CyE Elective 1	3 Core 34: Social and Behavior Science (SGE) <sup>050</sup>	3
	<b>15</b>	<b>15</b>

### Total Hours 126

<sup>2</sup> Additional math/science elective: Any MATH course numbered 200 and above that is not a degree requirement, except MATH 209, MATH 365, and MATH 526. Natural Science: Any course designated GE3N except basic science requirements. This must be in addition to the GE3N requirement. If a course used for the natural science elective exceeds the required natural science elective hours, then excess hours will be considered professional elective hours

### Notes:

\* - This course is a Required major course and is also part of Core 34: Systemwide General Education. If this course is not taken to fulfill the Core 34:SGE requirement, it must be taken in place of elective hours.

\*\* - This course is a Recommended Core 34: Systemwide General Education course. This specific course is not required but is recommended by the program's faculty.

\*\*\* - This course is a Required Core 34: Systemwide General Education course. This program is approved by the Kansas Board of Regents to require this specific Core 34: Systemwide General Education course. If a student did not take this course it must be taken in addition to other degree requirements.

At the completion of this program, students will be able to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Communicate effectively with a range of audiences.

- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate strategies.

An undergraduate student may graduate with departmental honors in electrical engineering, computer engineering, computer science, or interdisciplinary computing by graduating with a minimum grade-point average requirement while maintaining full-time status. In addition, students must enroll in EECS 498 Honors Research for their last 2 semesters and must complete an independent research project paper and oral presentation to a panel of 3 judges. See the EECS Undergraduate Handbook for full details.