

Cybersecurity Engineering Bachelor of Science Degree

FULL PROPOSAL

Submitted to: Ohio Department of Higher Education

Submit date: *to come*

Submitted by: College of Aeronautics and Engineering
Kent State University





HIGHER LEARNING COMMISSION

FORM

New Programs

Substantive Change Application

Institution: Kent State University

City, State: Kent, Ohio

Name of person completing this application: Therese E. Tillett

Title: AVP, Curriculum Planning/Administration Phone: 330-672-8558 Email: ttillet1@kent.edu

Date Submitted: *to come*

The questions are designed to elicit brief, succinct, detailed information, rather than a narrative or references to extensive supporting documents. Do not attach other documents unless they are specifically requested in the questions and are germane to the request. Excluding attachments, the completed application form should be no more than 12–15 pages on a single classification of change. The total submission, including attachments, should not exceed 200 pages.

If the person completing this application is not the CEO, CAO or the Accreditation Liaison Officer of the institution, it is understood that the person completing and submitting this application has consulted with and informed those individuals.

Please note: HLC plans to update the change forms annually, on or about September 1 of each year. However, if an application form was accessed more than 90 days prior to filing, please visit the hlcommission.org/change to ensure that there have been no changes to the form in the intervening time.

Submit the completed application as a single PDF file at hlcommission.org/upload. Select “Change Requests” form the list of submission options to ensure the application is sent to the correct HLC staff member.

Part 1: General Questions

1. Requested Change(s). Concisely describe the change for which the institution is seeking approval.

Kent State University seeks to establish a Bachelor of Science degree in Cybersecurity Engineering to prepare individuals who want to become professional engineers in the broad field of cybersecurity.

The program will be offered by the College of Aeronautics and Engineering on the Kent Campus.

2. Is this application being submitted in conjunction with another application?

☐ Yes

☒ No

If yes, please explain:

Not applicable.

3. Classification of Change Request.

Note: not every institutional change requires prior review and approval. Visit the hlcommission.org/change to make certain that current HLC policy requires the institution to seek approval.

New academic program(s):

- | | | |
|--------------------------------------|---|---|
| <input type="checkbox"/> Associate's | <input checked="" type="checkbox"/> Bachelor's | <input type="checkbox"/> Master's or specialist |
| <input type="checkbox"/> Doctorate | <input type="checkbox"/> Certificate or diploma | <input type="checkbox"/> New degree level |

An institution submitting more than one change request should complete multiple applications, one for each type of change. The types of change requests include:

- Change in mission
- Change in student body
- Competency-based education (credit-based, direct assessment, hybrid) programs
- Consortial arrangement
- Contractual arrangement
- Substantially changing the clock or credit hours required for a program
- Change in academic calendar (e.g., quarters to semester) or change in credit allocation
- Teach-out agreement if closing location provides total degree programs
- Distance or correspondence education
- New programs
- Certificate programs
- Branch campuses and additional locations

4. Special conditions. Indicate whether any of the conditions identified below fit the institution (Yes or No). If Yes, explain the situation in the space provided.

- a) Is the institution, in its relations with other regional, specialized, or national accrediting agencies, currently under or recommended for a negative status or action (e.g., withdrawal, probation, sanction, warning, show-cause)?

No.

- b) Is the institution now undergoing or facing substantial monitoring, special review, or financial restrictions from the U.S. Department of Education or other federal or state government agencies?

No.

- c) Has the institution's senior leadership or board membership experienced substantial resignations or removals in the past year?

No.

- d) Is the institution experiencing financial difficulty through such conditions as a currently declared state of exigency, a deficit of 10% or more, a default or failure to make payroll during the past year, or consecutive deficits in the two most recent years?

No.

- e) Is the institution experiencing other pressures that might affect its ability to carry out the proposal (e.g., a collective bargaining dispute or a significant lawsuit)?

No.

- 5. Internal and State Approvals.** Attach documentation of internal (faculty, board) and state approvals that the institution has obtained for the proposed change. All required approvals must be obtained before submitting the application to HLC. If no approval is required, attach evidence that approval is not needed.

Kent State University Board of Trustees approved the program on *date to come*, see Appendix A.

- 6. System Approvals.** If applicable, attach documentation of system approval that the institution has obtained for the proposed change. All required approvals must be obtained before submitting the application to HLC. If no approval is required, attach evidence that approval is not needed. Check the box below if the institution is not part of a system.

☒ Not Applicable

- 7. Foreign Country Approval(s).** If applicable, attach documentation of foreign country approval(s) that the institution has obtained for the proposed change. All required approvals must be obtained before submitting the application to HLC. If no approval is required, attach evidence that approval is not needed. Check the box below if the proposed change is not related to offerings in a foreign country.

☒ Not Applicable

- 8. Specialized Accreditation.** Complete this section only if specialized accreditation is required for licensure or practice in program(s) covered by this change application.

Accreditation is not required for graduates of the program to practice in the profession. However, the college will be seeking accreditation from ABET, which offers accreditation for cybersecurity programs under two separate and distinct commissions: the Computer Accreditation Commission and the Engineering Accreditation Commission. Both have the Computing Sciences Accreditation Board as a lead ABET society, which guides curricular requirements specific to the accreditation process; the Engineering Accreditation Commission also receives direction from the Institute of Electrical and Electronics Engineers and the International Council of Systems Engineering.

The college will seek accreditation under the ABET Engineering Accreditation Commission, which requires a curriculum that includes "engineering topics necessary to determine cybersecurity requirements and to analyze, design, test and protect complex devices and systems that incorporate hardware, software, and human components."¹

¹ ABET Accreditation Criteria 2019-2020. Retrieved from www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2019-2020/#3.

- ☐ The institution has already obtained the appropriate specialized accreditation. Attach a copy of the letter from the agency granting accreditation.
- ☐ The institution has begun the process of seeking or plans to seek specialized accreditation. Specify the name of the agency and the timeline for completing the process in the space below. (If approval is a multi-stage process, the institution should contact the HLC staff liaison to discuss the timeline before submitting this change application form.)
- ☐ The institution does not plan to seek specialized accreditation. Provide a rationale for not seeking this accreditation in the space below.

9. Changes Requiring Visits. This section is not for HLC-mandated visits such as additional location confirmation visits or campus evaluation visits.

Complete this section only if the institution is already aware that the proposed change will need to be reviewed through a visit. The institution may submit Part 1 of the change request application to begin the process of scheduling a Change Visit or adding the proposed change to an already scheduled visit. The full application must be submitted at a later date. (If the institution is unsure whether a visit is required, leave this section blank and submit the full change application. HLC will advise the institution based on the information provided.)

Not applicable. This proposal does not require a campus or location visit.

a) Select the type of visit the institution is requesting:

- ☐ Request to schedule a Change Visit.

Change Visits typically are scheduled approximately four months from the date an institution submits its change request. The full change application and other required materials will be due to HLC and the peer review team eight weeks before the visit date. See [Change Visit: Required Materials and Submission Procedures](#) for more information.

- ☐ Request to embed a Change Visit into an already scheduled visit. **Note:** Such requests must be submitted at least six months before the visit date. HLC staff will determine whether to embed a Change Visit based on peer reviewer availability and the complexity of the scheduled visit, among other factors. HLC may not be able to accommodate all requests. The institution's full change application should be submitted along with other materials required for the visit. Specify type of visit and date scheduled:

b) Provide URLs to the institution's Faculty/Staff Handbook and Catalog below. If the URLs are not available, please provide PDF versions of these documents when submitting other required materials prior to the visit.

Faculty/Staff Handbook URL:

Catalog URL:

Part 2: Topic-Specific Questions

An institution should submit a separate application for each requested program (unless the programs represent closely related disciplines). If more than one program is being requested in this application, please be sure to sufficiently address each program when answering the following questions, particularly in Sections A, D, E and F. Each proposed new program should be identified by using the [Classification of](#)

[Instructional Programs terminology \(CIP codes\)](#). CIP codes are established by the U.S. Department of Education's National Center for Education Statistics as a taxonomic scheme that supports the accurate tracking and reporting of fields of study and program completions activity.

Attach the "Substantive Change Application, Part 1: General Questions" as page one of your application. That completed form and your answers to the questions below will constitute your request for approval of a substantive change. This form will be the basis for review of this application.

Section A. Characteristics of the Change Requested

1. Identify the basic characteristics of the proposed educational program as indicated below:

- a) The full name of the proposed program, the specific degree (if applicable) or the instructional level (if not a degree program), and the six-digit CIP code XX.XXXX of the program (CIP codes, program name, and additional description [optional])

The full name of the proposed program is the Bachelor of Science degree in Cybersecurity Engineering. The CIP code that will be assigned is the following:

14.4701 Electrical and Computer Engineering: A program that prepares individuals to apply mathematical and scientific principles to the design and development of computer systems. Includes instruction in computer architecture, cybersecurity, electronic circuits, electromagnetism, electronic materials and design, micro-fabrication methods and techniques, signal and image processing, and wireless communication networks. *New for CIP 2020*

- b) Total credit hours (indicate whether semester or quarter) for completion of the program

The degree program is 123 semester credit hours, comprising 65 credit hours of engineering and computer science courses and 58 credit hours of physics, mathematics and general education (Kent Core) courses.

- c) Normal or typical length of time for students to complete the program

Full-time new students will be able to complete the program in four years (eight semesters).

- d) Proposed initial date for implementation of the program

The proposed implementation is the fall 2020 semester.

- e) Primary target audience for the program (e.g., full-time, part-time, traditional college age, working adults, transfer students, military personnel, or particular ethnic group)

The primary target audience is full-time, traditional-aged college students. Part-time and transfer students also will be accepted and advised regarding time to completion requirements. Students from underrepresented groups will be a target audience to contribute to the expansion initiative of diverse students in engineering.

- f) Whether the program will be part of contractual arrangement (see HLC's website for a [definition of contractual arrangements](#))

☒ No ☐ Yes

Important: If yes, complete the [Contractual Arrangement Screening Form](#) for each planned involvement to determine whether additional HLC approval is required.

- **If contractual approval is required:** Complete the full contractual application and submit it in conjunction with this application.
- **If approval is not required:** Attach the confirmation email from HLC to this application.

- g) Whether the program will be part of a consortial arrangement (see HLC's website for a [definition of consortial arrangements](#))

☒ No ☐ Yes

Important: If yes, complete the [Consortial Arrangement Screening Form](#) for each planned involvement to determine whether additional HLC approval is required.

- **If consortial approval is required:** Complete the full consortial application and submit it in conjunction with this application.
- **If approval is not required:** Attach the confirmation email from HLC to this application.

- h) Whether the program will be offered as distance education or correspondence education (see HLC's website for [definitions of distance and correspondence education](#))

☒ No ☐ Yes

Important: If yes, check the institution's distance delivery stipulation in its [Institutional Status and Requirements Report](#). If this program does not fit within the institution's current stipulation, submit a [distance delivery application](#) in conjunction with this application.

2. Identify if the institution is requesting new stipulations for the proposed program and provide a rationale for this request. **Note:** A change in stipulation requires an on-site visit by HLC peer reviewers. If the institution is requesting a new stipulation, please complete Section 1, Question 7.

Not applicable.

Section B. Institution's History With Programs

3. Does the institution currently offer a program at the same instructional level and with the same 4-digit CIP code (XX.XX) as the proposed program? If so, identify the program currently offered and whether it is a degree program. Will the proposed program replace the program currently offered?

CIP 14.4701 is the only code under CIP 14.47 (Electrical and Computer Engineering), which is new for CIP 2020. The proposed B.S. degree in Cybersecurity Engineering will not replace any currently offered program at Kent State.

4. Does the institution currently offer two or more programs at the same instructional level with the same 2-digit CIP code (XX.) as the proposed program? If so, identify the two such programs with the highest numbers of graduates during the past year, along with their numbers of graduates.

At the bachelor's degree level, Kent State offers three programs under the same two-digit CIP 14 (Engineering), of which two are new and have not graduated a cohort yet.

- Applied Engineering (B.S. degree): 54 graduates in fiscal year 2019

Section C. Institutional Planning for Program Change

5. What impact might the proposed program have on challenges identified as part of or subsequent to the last HLC review and how has the institution addressed the challenges?

Not applicable.

6. Describe the planning process for determining the need for this new program, including the role of faculty in the planning and approval process.

The B.S. degree in Cybersecurity Engineering has been proposed by the computer engineering technology faculty in the College of Aeronautics and Engineering. Faculty are currently working with the National Security Administration to have its B.S. degree in Computer Engineering Technology designated as a Center of Academic Excellence in Cyber Defense.² This distinction will transition to the proposed cybersecurity engineering degree program once the program is in place. Faculty are also working to establish partnerships with the State of Ohio, University of Cincinnati and University of Akron in the Ohio Cyber Collaboration Committee.³

In addition to being approved by the faculty and members of the college curriculum committee, the Cybersecurity Engineering major was approved by the Educational Policies Council, a subcommittee of the Faculty Senate (*date to come*); and the Faculty Senate (*date to come*).

7. What are the physical facilities and equipment needed to support the program? Indicate the impact that the proposed change will have on the physical resources and laboratories that currently accommodate existing programs and services, or identify new laboratory and preceptor needs.

In 2015, the College of Aeronautics and Engineering moved into a new, 55,000-square-foot building on the Kent Campus and has more than doubled the number of lab spaces since then. In addition, there is a planned wing annex to add an additional 17,000 square feet of faculty, classroom and research space in the building. The university is in the process of fundraising with a projected groundbreaking in 2020. With the addition of this space, the college will have the resources to support the proposed degree program and other programming initiatives.

² National Security Agency, Central Security Service (n.d.). National Centers of Academic Excellence. Retrieved from www.nsa.gov/resources/students-educators/centers-academic-excellence.

³ Ohio Cyber Collaboration Committee (n.d.). Retrieved from www.ohioc3.org.

The college is also the primary operator at the Kent State University airport at which construction recently finished on a \$7 million, on-site academic center funded in part by Federal Express.

The new airport facility includes classrooms, flight debriefing rooms, four new flight simulators and a faculty research laboratory.

8. What is the evidence that a market for the new program(s) exists? How has estimated program demand been factored into realistic enrollment projections? How has this evidence been used in planning and budgeting processes to develop a quality program that can be sustained?

The Bureau of Labor Statistics projects that the job outlook for information security analysts (those who plan and carry out security measures to protect an organization's networks and systems) will grow by an astounding 32 percent in the next 10 years.⁴ See Appendix B for letters of support from area industry.

The program is anticipated to launch with a conservative enrollment of 30 students, of which it is expected to be comprised primarily of full-time students. The projection is due to the general demand in this professional area, the reputation of Kent State University and a targeted marketing campaign the college plans to roll out for the program. In the past three years, the College of Aeronautics and Engineering has launched successfully six new bachelor's degrees:

New B.S. Degree Program	Established	Enrollment*
Aeronautical Systems Engineering Technology	2017	61
Aerospace Engineering	2016	63
Computer Engineering Technology	2018	69
Mechanical Engineering Technology	2018	75
Mechatronics Engineering	2018	14
Mechatronics Engineering Technology	2018	36

** Fall 2019 student enrollment (15th day census), Office of Institutional Research*

Recognizing the increase of students arriving with significant college credits earned while completing their high school education (e.g., AP, College Credit Plus), the college specifically considered this trend in its plans and projections for the program.

Many of the courses for the program's curriculum are existing and offered for other programs. For example, the college's Computer Engineering Technology major comprises a large number of courses that are directly relevant to this proposed degree. Students in the computer engineering technology program have completed capstone projects focused on cybersecurity engineering. In addition, the college offers an undergraduate minor in electronic technology and is partnering with Kent State's College of Applied and Technical Studies to create pathway programs for that college's A.A.S. degree in Electrical/Electronic Engineering Technology and B.S. degree in Engineering Technology, both offered on the Tuscarawas Campus. Both colleges currently have programs accredited by ABET.

⁴ Bureau of Labor Statistics: U.S. Department of Labor (2018). Retrieved from www.bls.gov/ooh/computer-and-information-technology/information-security-analysts.htm.

While that the College of Aeronautics and Engineering has focus and experience with hardware and human factors, it does not with software. This deficiency creates opportunities for the college to work collaboratively with other academic departments within Kent State to fill the gap in curriculum and best leverage existing expertise and offerings. As one example, the Department of Computer Science offers a comprehensive set of courses that address the software and information security implications for the design of an engineered system.

After two years of implementation, the college plans to recruit industry professionals to provide instruction in courses specific to this program. This enables flexibility to adjust to enrollment levels and contain costs. Recognizing that this specialty field may require two to three times the normal rate for part-time instructors, the college has included those higher rates in financial projections. Ohio students may be eligible for targeted programs such as [Choose Ohio First](#), and the college's development office will be seeking philanthropic support to create scholarships for students, especially for non-Ohio students who pay a non-resident surcharge. The college is committed to such scholarships to the extent that the end result is equal to or exceeds the tuition plus state share of instruction that is normal for Ohio residents.

9. If the program request is approved, what future growth do you anticipate (e.g., in the next six months, three years) and how do you plan to manage this growth?

The program is projected to grow from total FTE enrollment of 30 in the launch year to 100 students in year three. This is due to building out of the program, i.e., students normally progressing through their academic careers, increase in entering freshmen each year and additional enrollment arising from change of majors within the university and transfer students from other institutions. Current tenure-track faculty are available to support program planning and some program-specific instruction. Additional instructional resources will be primarily filled by part-time faculty drawn from area firms and the addition of non-tenure track faculty as needed.

10. How does this program fit into the current and expected financial picture of the institution? In particular, will the program be financially self-sufficient within three years? If not, when do you expect the program to be financially self-sufficient and how do you expect the program to operate until then? Submit a three-year budget projection for the proposed program with the application.

Undergraduate enrollment in the College of Aeronautics and Engineering increased in the past year, from 869 students in fall 2018 to 919 in fall 2019, and current admission data indicates growth next year. Generally, the college is positioned to increase both undergraduate and graduate enrollment over the next several years. While the college's sponsored research and public service programs were essentially constant for several years, sponsored project awards are on track to more than double in the current year. The college is expanding its non-degree programming with a focus on micro-credentials. The proposed degree program supports the future strategy of extracting focused, non-credit programming from credit course and program content that may be adapted to offering micro-credentials to non-credit students.

The B.S. degree in Cybersecurity is projected to make a significant net contribution to the college by its fourth year. Deferred State Share of Instruction (i.e., the 50 percent based on graduation rates of students in those first four years), will contribute to the following six years. As the college experiences overall growth, it is anticipated to move to a breakeven position in fiscal year 2021 and moving to more significant fund balance contributions over the next two fiscal years as newer programs come to completion. Thus, any shortfall due to this program will be addressed by projected fund balance contributions with contingency funding provided by the college's existing fund balance. See Appendix C for a fiscal impact statement for the proposed degree program.

11. What controls are in place to ensure that the information presented to all constituencies in advertising, brochures, and other communications will be accurate?

The Office of the Provost ensures that only faculty- and university-approved program information is included in the University Catalog, degree audit, Explore Programs and Degrees website and student information system (for program admission and graduation). The College of Aeronautics and Engineering employs marketing staff who are responsible for ensuring the consistency and accuracy of messages in promotional communications. In addition, Kent State's Division of University Communications and Marketing coordinates branding and consistency of all of the university's promotional materials, including the Kent State website.

Section D. Curriculum and Instructional Design

12. Please list all the courses that comprise the program and identify if the program will include any new courses. Include course descriptions and number of credit hours for each.

See Appendix D for descriptions of courses comprising the program.

13. What are the requirements students must fulfill to complete the program successfully (including specific courses, course options, and any other requirements)?

See Appendix E for the program's catalog page, including admission and graduation requirements.

Major Requirements (65 credit hours)		
CS 23001	Computer Science II: Data Structures and Abstraction	4
CS 23022	Discrete Structures for Computer Science	3
CS 47207	Digital Forensics	3
CS 47221	Introduction to Cryptology	3
ENGR 20000	Professional Development in Engineering	1
ENGR 20005	Introduction to Cybersecurity Engineering	3
ENGR 26301	Networking Hardware I	4
ENGR 27100	Fundamentals of Operating Systems for Engineering	NEW 3
ENGR 30000	Professional Development in Aeronautics	3
ENGR 33320	Applied Embedded Systems I	3
ENGR 35500	Signals and Circuits	3
ENGR 35501	Signals and Circuits Laboratory	1
ENGR 35550	Law and Ethics for Engineers	NEW 3
ENGR 36302	Networking Hardware II	3

<i>Major Requirements continued</i>		
ENGR 36337	Information Technology Security	3
ENGR 46300	Network Security	3
ENGR 46312	Wireless Network and Telecommunication Systems	3
ENGR 46316	Server Administration and Configuration I	3
ENGR 48099	Engineering Capstone I NEW	3
ENGR 48199	Engineering Capstone II NEW	3
Computer Programming Elective, choose from the following:		4
CS 13001	Computer Science I: Programming and Problem Solving	
CS 13011	Computer Science IA: Procedural Programming	
& CS 13012	Computer Science IB: Object Oriented Programming	
Major Elective, choose from the following:		3
CS 33007	Introduction to Database System Design	
CS 43401	Secure Programming	
CS 47206	Data Security and Privacy	
ENGR 33031	Programmable Logic Controllers	
ENGR 47200	Systems Engineering	
Additional Requirements (58 credit hours)		
COMM 15000	Introduction to Human Communication	3
ENG 30062	Principles of Technical Writing	3
MATH 12002	Analytic Geometry and Calculus I	5
MATH 12003	Analytic Geometry and Calculus II	5
MATH 30011	Basic Probability and Statistics	3
MATH 32051	Mathematical Methods in The Physical Sciences I	4
PHY 23101	General University Physics I	5
PHY 23102	General University Physics II	5
UC 10097	Destination Kent State: First Year Experience	1
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		9
Kent Core Social Sciences (must be from two disciplines)		6
Kent Core Additional		3
Minimum Total Credit Hours: 123		

Section E. Institutional Staffing, Faculty, and Student Support

14. How many and what types of faculty (full-time or part-time) will be employed in the program? Why is the number and type of faculty sufficient to support the program? How many, if any, new faculty will be hired for the program?

Over the past six years, the College of Aeronautics and Engineering has increased its engineering capabilities by increasing the number of faculty with engineering or closely-related backgrounds—from three full-time faculty members in 2013 to 14 full-time faculty members in 2019. There will be 14 full-time faculty from the college who will teach the major courses in the proposed program, in addition to four full- and two part-time faculty members from the Department of Computer Science. While an increase in the number of faculty may be required after program implementation and as the enrollment grows, at this time there is no anticipated immediate need for additional faculty.

15. Provide a brief attachment that inventories each faculty member employed to teach in the program, including names, a description of each faculty member's academic qualifications, their prior instructional responsibility and other experiences relevant to the courses they will teach in the program, each faculty member's course load in the new program, and the course work each currently teaches at the institution. If faculty have not yet been hired, please include an advertisement for the position and a job description for the position. (Note: Do not attach full CVs for each faculty member; rather, the requested information should be summarized in one paragraph for each faculty member or provided in a faculty chart.)

Faculty listed below will teach the courses in the major requirements.

Faculty from College of Aeronautics and Engineering		
Instructor	Terminal Degree	Course Taught or Proposed
Md Amiruzzaman Assistant Professor <i>Tenure Track</i>	Ph.D., Kent State University, 2016	ENGR 33320 Applied Embedded Systems I
Darwin Boyd Assistant Professor <i>Tenured</i>	Ph.D., Kent State University, 1991	ENGR 33031 Programmable Logic Controllers
Xuhui (Tracy) Chen Assistant Professor <i>Tenure Track</i>	Ph.D., Case Western Reserve University, 2019	ENGR 20005 Introduction to Cybersecurity Engineering ENGR 46312 Wireless Network and Telecommunication Systems
Yanhai Du Associate Professor <i>(Tenured)</i>	Ph.D., University of Waikato, 2004	ENGR 48099 Engineering Capstone I NEW ENGR 48199 Engineering Capstone II NEW
Evren Koptur Assistant Professor <i>(Non-Tenure Track)</i>	Ph.D., Kent State University, 2016	ENGR 36337 Information Technology Security ENGR 46316 Server Administration and Configuration I
Sarath Chandra Kunda Lecturer <i>(Non-Tenure Track)</i>	M.D.S., Kent State University, 2015	ENGR 27100 Fundamentals of Operating Systems for Engineering NEW ENGR 26301 Networking Hardware I ENGR 36302 Networking Hardware II ENGR 47200 Control Systems Security Engineering
Rui Liu Assistant Professor <i>(Tenure Track)</i>	Ph.D., Colorado School of Mines, 2018	ENGR 48099 Engineering Capstone I NEW ENGR 48199 Engineering Capstone II NEW
Jason Lorenzon Lecturer <i>(Non-Tenure Track)</i>	J.D, Cleveland State University, 2007	ENGR 35550 Law and Ethics for Engineers NEW
Ye Lu Assistant Professor <i>(Tenure Track)</i>	Ph.D., Purdue University, 2019	ENGR 48099 Engineering Capstone I NEW ENGR 48199 Engineering Capstone II NEW
Maureen McFarland Associate Dean and Assistant Professor <i>(Non-Tenure Track)</i>	Ph.D., Kent State University, 2017	ENGR 47200 Systems Engineering ENGR 20000 Professional Development in Engineering

Faculty from College of Aeronautics and Engineering continued		
Instructor	Terminal Degree	Course Taught or Proposed
Tao Shen Assistant Professor (<i>Tenure Track</i>)	Ph.D., University of Nebraska-Lincoln, 2016*	ENGR 35500 Signals and Circuits ENGR 35501 Signals and Circuits Laboratory
David (Blake) Stringer Associate Professor (<i>Tenured</i>)	Ph.D., University of Virginia, 2008	ENGR 48099 Engineering Capstone I NEW ENGR 48199 Engineering Capstone II NEW
Michael Testa Lecturer (<i>Non-Tenure Track</i>)	M.S.M., University of Akron, 1997	ENGR 46300 Network Security ENGR 26301 Networking Hardware I ENGR 36302 Networking Hardware II ENGR 46312 Wireless Network and Telecommunication Systems
Faculty from Department of Computer Science, College of Arts and Sciences		
Arvind Bansal Professor (<i>Tenured</i>)	Ph.D., Case Western Reserve University, 1985	CS 23022 Discrete Structures for Computer Science**
Angela Guercio Associate Professor (<i>Tenured</i>)	Ph.D., Kent State University, 2004	CS 13001 Computer Science I: Programming and Problem Solving**
Md Amjad Hossain Part-time Instructor	Ph.D., Kent State University, 2018	CS 33007 Introduction to Database System Design
Maha Allouzi, Lecturer (<i>Non-Tenure Track</i>)	Ph.D. candidate, Kent State University	CS 47221 Introduction to Cryptology
Xiang Lian Assistant Professor (<i>Tenure Track</i>)	Ph.D., Hong Kong University of Science and Technology, 2009	CS 23001 Computer Science II: Data Structures and Abstraction
Mikhail Nesterenko Professor (<i>Tenured</i>)	Ph.D., Kansas State University, 1998	CS 13011 Computer Science IA: Procedural Programming** CS 13012 Computer Science IB: Object Oriented Programming
Jonathan Maletic Professor (<i>Tenured</i>)	Ph.D., Wayne State University, 1995	CS 23001 Computer Science II: Data Structures and Abstraction
Paweena Manotipya Graduate Assistant	Ph.D. candidate, Kent State University	CS 47207 Digital Forensics
L. Gwenn Volkert, Associate Professor (<i>Tenured</i>)	Ph.D., Wayne State University, 2001*	CS 13011 Computer Science IA: Procedural Programming** CS 13012 Computer Science IB: Object Oriented Programming
Computer science faculty TBD	Doctorate in computer science	CS 43401 Secure Programming CS 47206 Data Security and Privacy

* Transcript is not on file in the Kent State University Office of Academic Personnel.

** Course is also taught by graduate teaching assistants when needed.

16. For graduate programs, document scholarship and research capability of each faculty member; for doctoral programs, document faculty experience in directing student research.

Not applicable.

17. What library and information resources—general as well as specific to the program(s)—and staffing and services are in place to support the initiative? If the proposed new program is at the graduate level, document discipline-specific refereed journals and primary source materials.

The Kent State University Libraries provide on-ground and online access to thousands of journals, books and databases to students across all eight campuses (through KentLink). Kent State is a member of OhioLink, which gives students access to library materials and electronic research databases from 120 academic libraries in Ohio. Kent State also maintains a license with Safari Books, a digital library of more than 40,000 books, videos and interactive tutorials. University Libraries provide instructional services, including workshops and in-class visits, to educate students on finding and using information effectively and ethically.

A science librarian works with the College of Aeronautics and Engineering to create awareness of library resources and programs and to build library collections appropriate for the department's programs and curriculum. There is an annual budget allocated by the library and administered by the science librarian to support the resource needs of the college. In addition, the science librarian teaches information literacy classes that focus on the usage of these materials.

Section F. Evaluation

18. Describe the process for monitoring, evaluating and improving the overall effectiveness and quality of the program, and articulate program-level learning outcomes and objectives.

One objective of the program will be to provide students with a working knowledge of "analysis and evaluation of components and systems with respect to security and to maintaining operations in the presence of risks and threats"⁵ with an emphasis on engineered systems. Students will gain the knowledge and skills necessary to address security issues pertaining to stakeholder needs and requirements (from a system engineering perspective) considering the lifecycle of the system from the outset. Design and development of systems, their components and associated networks to increase trustworthiness is a driving concern.

The student learning outcomes will be developed so that graduates of this program will be able to:

1. Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. 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

⁵ ABET Accreditation Criteria 2019-2020. Retrieved from www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2019-2020/#3.

3. Communicate effectively with a range of audiences
 4. 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
 5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
 6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
 7. Acquire and apply new knowledge as needed, using appropriate learning strategies.
19. Describe the process for assessing and improving student learning, including student persistence and completion, in the new program.

While the traditional means to assess learning are employed with this program, such as quizzes, exams, papers and problem sets, the nature of an engineering technology program lends itself to a natural assessment process. So many of the courses in the Cybersecurity Engineering major have a lecture and a lab component to them, which provides students the opportunity to learn the material during the lecture and then apply what they have learned during the lab. Labs provide an active way to learn which helps students stay engaged and increases persistence.

To further that objective, the course materials are designed so that students understand how the material is relevant to them, how it applies to their everyday life and how it improves their chances of getting the job they may someday want.

Another way student learning is assessed is through internships. While this program does not require that every student participates in an internship, they are encouraged to do so. Students who choose to receive credit for working in an internship are required to journal about their experience weekly and write a paper at the end of the semester. This encourages students to articulate what they have learned. This is a good assessment tool. The employer is also asked to evaluate the student and provide feedback about the student's knowledge and performance. Having a "real-world" experience provides students with the opportunity to understand why they take the courses that they do, implement what they have learned and determine what they may like to do in the future, which increases persistence.

**Interdepartmental Correspondence
College of Arts and Sciences
Kent State University**

To: Christina Bloebaum, Dean, College of Aeronautics and Engineering

From: James Blank, Dean, College of Arts and Sciences

Date: 1/10/18

I am pleased to provide this letter of support for your proposal for a new B.S. degree in Cybersecurity Engineering. I view this new degree program as distinct from our computer science degree programs, yet complementary to the latter. Therefore, I believe this degree program will provide new opportunities for students interested in applying principles of engineering, science, and mathematics to issues in the area of cybersecurity. The Departments of Mathematical Sciences, Computer Science and Physics likely have coursework that would be beneficial to the education of your students and we would be pleased to work with your college in developing a dynamic and attractive undergraduate degree program.



01/13/2020

Dr. Christina Bloebaum
1400 Lester A. Lefton Esplanade
Kent, Ohio 44242

Dear Dr. Bloebaum

Letter in support of KSU College of Aeronautics and Engineering's (CAE) proposal to create a Cybersecurity Engineering program.

Rockwell Automation is pleased to write this letter in support of KSU College of Aeronautics and Engineering's (CAE) proposal to create a Cybersecurity Engineering program. We at Rockwell Automation strongly believe that there is an industrial need for a program that produces engineering professionals that understand the cybersecurity system implications that involve hardware, software, networking, and user.

Cybersecurity has become a huge issue for industry. Expertise in this area is a critical need as companies progress with digital transformation, operations & information technologies converge, and enterprise threat vectors increase. The number of associated positions available in this area within Rockwell Automation and our customers has grown considerably.

Rockwell Automation Inc. is a leading global provider of industrial automation controls and information solutions to a broad range of industries. Rockwell Automation is frequently recognized by Ethisphere as one of the world's most ethical companies, for our innovative technologies and for corporate social responsibility. Rockwell Automation is singularly focused on industrial automation and helping our customers achieve, smart, safe and sustainable manufacturing operations and the productivity necessary to remain globally competitive.

Rockwell Automation has a long history of partnering with education through national sponsorship of FIRST robotics programs, Project Lead the Way at schools to encourage participation in key STEM activities especially amongst under-represented groups and universities and vocational colleges in order that students experience hands-on industry relevant applications of automation technology to enrich industry learning and enter the workforce with relevant and valuable skills.

We look forward to hearing that this degree has been established as this will be another potential area of collaboration.

Sincerely,

A handwritten signature in black ink, appearing to read 'Michael Cook', with a stylized flourish at the end.

Michael Cook
Director, Global Academic Organization
Rockwell Automation, 1201 South Second Street, Milwaukee, 53204
mcook@ra.rockwell.com

expanding human possibility



Allen-Bradley
by ROCKWELL AUTOMATION



FactoryTalk
by ROCKWELL AUTOMATION



ATTN: Kent State University
Dr. Joycelyn Harrison
1400 Lester A Lefton Esplanade
Kent, OH 44242

Dear Dr. Harrison,

This message is in support of the proposed cybersecurity engineering bachelor's degree for Kent State University. Cybersecurity Engineering is continually evolving and one of the fastest growing industries in technology. With the threats faced in doing technology and business, it's never been more critical to have skills developed in cyber security engineering. I am the founder of several large-sized cyber security firms and one of the challenges we face is finding qualified personnel to join the team. We range from hiring juniors to some of the most seasoned experts in the world. The cybersecurity field is continually expanding in a number of different ways and is a continual effort to stay ahead of adversaries.

We partner with a number of colleges offering cybersecurity engineering degrees and have had large success in recruiting new people into the industry. The proposed curriculum provided looks to build a solid foundation of many core concepts needed in the cybersecurity engineering field. A combination of foundational networking, programming, forensics, and security concepts is extremely important in the development of these careers.

I have been in the cyber security industry for over 20 years including working for the U.S. intelligence field for a number of years. The importance of this field has grown year after year and the defense of companies, and the United States has never been more important. Having qualified personnel to learn, grow, and expand the field is paramount to its success. The current estimate from ISC2 on the shortage of cybersecurity positions in 2019 field hit 3 million globally. Having a cybersecurity engineering degree would be a great fit in the Kent State bachelor program.

If you have any questions or concerns, please feel free to reach out to me at any time.

Best regards,

A handwritten signature in black ink, appearing to read 'David Kennedy', with a stylized flourish at the end.

David Kennedy
Founder, CEO
TrustedSec, LLC and Binary Defense Systems
E: David.Kennedy@TrustedSec.com

January 18, 2020

Dr. Christina Bloebaum
1400 Lester A. Lefton Esplanade
Kent, Ohio 44242

Dear Dr. Bloebaum:

As an Alumni and a member of the Computer Engineering Industrial Advisory Board, I fully support Kent State's College of Aeronautics and Engineering's proposal to create a Cybersecurity Engineering program. Davey Tree believes that programs like this one are critical to not only Ohio, but also the country.

There is not a single industry that has not been, and will continue to be, severely affected by the growing issue of cybersecurity. Today's cybersecurity threat landscape in which every company faces is growing faster than the technical expertise companies can hire to protect them. According to Gartner, cybersecurity engineering is, and will continue to be in the foreseeable, the greatest demand to hire in IT beating out Data Scientists and Artificial Intelligence/Machine Learning engineers.

Even in the environmental and professional services industry, Davey Tree has not been immune to cybersecurity issues. These issues have not only impacted technical areas of our business but has also changed in how our company fundamentally does business. These changes have come with operational, and of course financial impact, to protect the company, our customers, and adhere to the ever-growing list of standards handed down by state and federal lawmakers.

The role of the cybersecurity engineer in any business is a unique role that requires sound technical knowledge as well as knowledge of critical business processes. Security engineers need to be able to orchestrate different areas of the business to put in place a sound security program. Currently, companies like Davey Tree have to create this kind of talent in-house and then attempt to retain that very same talent in an increasingly competitive job market. Graduates of a Cybersecurity Engineering program would be able to hire into a company and quickly and integrate into a team with other security engineers. As an IT leader, I can't overstate how critical that is.

We already look to Kent State for many of our workforce development needs. This program will just add a touchpoint to our relationship for internships and full time hires for students.

Sincerely,



Greg Dyke

Manager of Technical Services
Davey Tree

APPENDIX C

	Year 1	Year 2	Year 3	Year 4
I. Projected Enrollment				
a. Headcount full-time	25	56	97	137
b. Headcount part-time	12	27	47	73
c. Full-time equivalent (FTE) enrollment	31	70	121	174
II. Projected Program Income				
a. Tuition	\$ 275,965	\$ 643,431	\$ 1,149,027	\$ 1,680,476
b. Expected state subsidy (SSI)	\$ 85,603	\$ 172,596	\$ 423,325	\$ 832,723
c. Externally funded stipends, as applicable	\$ 20,000	\$ 40,000	\$ 60,000	\$ 80,000
d. Other Income	\$ 6,200	\$ 13,900	\$ 24,100	\$ 34,700
Total Projected Program Income	\$ 387,768	\$ 869,928	\$ 1,656,453	\$ 2,627,899
III. Program Expenses				
a. New personnel:				
- 1. Instruction				
i. Full-time: (0.5 to 1.25)	\$ -	\$ -	\$ 35,000	\$ 89,688
ii. Part-time: (sufficient to deliver 7 to 9, 3-credit sections)	\$ -	\$ -	\$ 52,500	\$ 69,188
- 2. Non-instruction				
i. Full-time:	\$ -	\$ -		
ii. Part-time:	\$ -	\$ -	\$ -	\$ -
b. Current personnel:				
- 1. Instruction				
i. Full-time: (20% of 2 TT faculty)	\$ 38,000	\$ 38,950	\$ 39,924	\$ 40,922
ii. Part-time:	\$ -	\$ -	\$ -	\$ -
- 2. Non-instruction				
i. Full-time: (partial funding 0.1 to 0.6)	\$ 5,167	\$ 11,873	\$ 21,100	\$ 31,140
ii. Part-time:	\$ -	\$ -	\$ -	\$ -
c. Benefits for all personnel	\$ 19,425	\$ 19,109	\$ 44,405	\$ 71,756
d. New facilities/building/space renovation (describe in narrative below)	\$ -	\$ -	\$ -	\$ -
e. Scholarship/stipend support	\$ 10,000	\$ 20,000	\$ 30,000	\$ 40,000
f. Additional library resources	\$ 1,000	\$ 1,500	\$ 2,000	\$ 3,000
g. Additional technology or equipment needs	\$ -	\$ 75,000	\$ 150,000	\$ 150,000
h. Other expenses (see below)	\$ 310,575	\$ 649,625	\$ 1,179,358	\$ 1,810,234
Total Projected Program Expenses	\$ 384,166	\$ 816,057	\$ 1,554,287	\$ 2,305,927
Projected Program Net	\$ 3,601	\$ 53,870	\$ 102,166	\$ 321,972
As percentage of total income	1%	6%	6%	12%
Other Expenses				
h.1. Allocation of expenses covered by general fee	\$ -	\$ -	\$ -	\$ -
h.2. RCM overhead - estimated at 50%	\$ 180,783.76	\$ 408,014	\$ 786,176	\$ 1,256,600
h.3. RCM tuition and SSI allocation to other colleges	\$ 103,291	\$ 205,611	\$ 346,181	\$ 493,634
h.4. Professional development	\$ 500	\$ 1,000	\$ 2,000	\$ 4,000
h.5. Supplies (office, computer software, duplication, printing)	\$ 500	\$ 1,000	\$ 1,500	\$ 2,000
h.6. Telephone, network, and lines	\$ 500	\$ 1,000	\$ 1,500	\$ 2,000
h.7. Other info and communication pool	\$ 25,000	\$ 33,000	\$ 42,000	\$ 52,000
Total Other Expenses	\$ 310,575	\$ 649,625	\$ 1,179,358	\$ 1,810,234

BUDGET NARRATIVE:

[This section is for describing facilities, scholarship/stipend support, library resources, additional technology, etc., if applicable.]

- I.
 - a. Full Time:

Freshmen starting with 15 in year 1, increasing 50%, 40% & 30% over the prior year in years 2, 3 and 4 respectively

85% of freshmen continue as sophomores, 90% of sophomores continue as juniors & 95% of juniors continue as seniors.

Students recruited as transfers and major changes increase enrollment of sophomores & juniors by 10% over base rate advancing from freshmen and sophomores in years 2, 3 & 4.

Ten students enter as sophomores as a result of college credit plus credits each year in years 1, 2, 3 & 4
 - b. Part Time:

Freshmen starting numbers are: 5, 8, 11 & 14 in years 1, 2, 3 & 4 respectively.

Approximately 1/2 time, so two years to complete each year (freshman, sophomore, junior & senior)

Continuation rates are similar to those for full time students.
 - c. FTE equals full time plus 1/2 of part time.
- II.
 - a. All students treated as Ohio residents for tuition purposes. Includes tuition for all students, full time and part time in all courses CAE and others.
 - b. All students treated as Ohio residents for SSI purposes. If students are non-residents, the non-resident surcharge exceeds SSI, thus this is a conservative approach.
 - 50% applicable to course completion is considered. 50% applicable to graduation is considered only for years 3 & 4
 - c. Matching funds from CAE plus equal amounts from Choose Ohio First or other scholarships
 - d. Sum of proposed program fees of \$100 per semester per student.
- III.
 - a.1.ii New personnel are NTT faculty. Since NTT faculty may teach courses involving multiple majors, fractions of new NTT faculty are considered.
 - b.1.i 20% of two existing TT faculty.
 - b.2.i Partial commitment of academic advisor. Basis 1 academic advisor / 300 undergraduates enrolled.
 - c. Benefits - full time estimated at 45% of salary (medical at current value with basis salary of \$50,000), part time at 15.81%
 - e. College matching contributions to Choose Ohio First or other scholarship programs
 - f. Allowance for acquisition of national and international standards and other materials not otherwise readily available through KSU Libraries.
 - g. Allowance for acquisition of computer and embedded systems hardware and software related to the program
 - h.2 RCM overhead - estimated at 50% - Basis all (CAE + Other) tuition & SSI
 - h.3 RCM tuition and SSI allocation to other colleges - Total of Tuition & SSI earned by units other than CAE reduced 50% to address RCM

B.S. Degree in Cybersecurity Engineering – Catalog Copy**APPENDIX E****College of Aeronautics and Engineering**

Aeronautics and Technology Building
 Kent Campus
 330-672-2892
 cae@kent.edu
 www.kent.edu/cae

Description

The Bachelor of Science degree in Cybersecurity Engineering prepares individuals who want to become professional engineers in the broad field of cybersecurity. The program provides students with a working knowledge of analysis and evaluation of components and systems with respect to security and to maintaining operations in the presence of risks and threats, with an emphasis on engineered systems. Students gain the understanding and skills necessary to address security issues pertaining to stakeholder needs and requirements (from a system engineering perspective) considering the lifecycle of the system from the outset. Design and development of systems, their components and associated networks to increase trustworthiness is a driving concern.

FULLY OFFERED AT:

- Kent Campus

Admission Requirements

Admission to the Cybersecurity Engineering major is selective.

Freshman Students: Admission into the Cybersecurity Engineering major requires a minimum 3.0 high school GPA and a minimum 24 ACT composite score (minimum 24 ACT sub-scores in both English and mathematics) or a minimum 1160 SAT composite score (mathematics, critical reasoning and writing); and placement directly into MATH 12002 (or its equivalent). Students who do not meet these requirements may apply for admission to the Computer Engineering Technology major and request to change their program to the Cybersecurity Engineering major after their freshman year if they meet the following criteria: minimum 3.200 overall Kent State GPA and minimum B grade in both MATH 12002 and PHY 23101.

English Language Proficiency Requirements for International Students: All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 525 TOEFL score (71 on the Internet-based version), minimum 75 MELAB score, minimum 6.0 IELTS score or minimum 48 PTE Academic score, or by completing the ELS level 112 Intensive Program. For more information on international admission, visit the Office of Global Education's admission website.

Transfer Students: Admission into the Cybersecurity Engineering major requires a minimum 12 credit hours in college-level coursework with a minimum 3.200 overall GPA and a minimum B grade in both MATH 12002 and PHY 23101 (or their equivalents). Transfer students who have completed less than 12 credit hours of college-level coursework will be evaluated on both collegiate and high school records and must submit a final high school transcript and an ACT or SAT score.

Program Learning Outcomes

Graduates of this program will be able to:

- 1 An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- 2 An ability to 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
- 3 An ability to communicate effectively with a range of audiences
- 4 An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in a global,

B.S. Degree in Cybersecurity Engineering – Catalog Copy**APPENDIX E**

- 5 economic, environmental, and societal context
- 6 An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- 7 An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- 8 An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Requirements**MAJOR REQUIREMENTS****Major Requirements (courses count in major GPA)**

CS 23001	Computer Science II: Data Structures and Abstraction	4
CS 23022	Discrete Structures for Computer Science	3
CS 47207	Digital Forensics	3
CS 47221	Introduction to Cryptology	3
ENGR 20005	Introduction to Cybersecurity Engineering	3
ENGR 20000	Professional Development in Engineering	1
ENGR 26301	Networking Hardware I	4
ENGR 27100	Fundamentals of Operating Systems for Engineering	3
ENGR 3	Professional Development in Aeronautics	3
ENGR 33320	Applied Embedded Systems I	3
ENGR 35500	Signals and Circuits	3
ENGR 35501	Signals and Circuits Laboratory	1
ENGR 35550	Law and Ethics for Engineers	3
ENGR 36302	Networking Hardware II	3
ENGR 36337	Information Technology Security	3
ENGR 46300	Network Security	3
ENGR 46312	Wireless Network and Telecommunication Systems	3
ENGR 46316	Server Administration and Configuration I	3
ENGR 48099	Engineering Capstone I	3
ENGR 48199	Engineering Capstone II	3
Computer Programming Elective, choose from the following:		4
CS 13001	Computer Science I: Programming and Problem Solving	
CS 13011	Computer Science IA: Procedural Programming	
& CS 13012	Computer Science IB: Object Oriented Programming	
Major Elective, choose from the following:		3
CS 33007	Introduction to Database System Design	
CS 43401	Secure Programming	
CS 47206	Data Security and Privacy	
ENGR 33031	Programmable Logic Controllers	
ENGR 47200	Systems Engineering	

Additional Requirements (courses do not count in major GPA)

COMM 15000	Introduction to Human Communication	3
ENG 30062	Principles of Technical Writing	3
MATH 12002	Analytic Geometry and Calculus I	5
MATH 12003	Analytic Geometry and Calculus II	5
MATH 30011	Basic Probability and Statistics	3
MATH 32051	Mathematical Methods in The Physical Sciences I	4
PHY 23101	General University Physics I	5
PHY 23102	General University Physics II	5
UC 10097	Destination Kent State: First Year Experience	1
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		9
Kent Core Social Sciences (must be from two disciplines)		6
Kent Core Additional		3

Minimum Total Credit Hours: 123

B.S. Degree in Cybersecurity Engineering – Catalog Copy**APPENDIX E****GRADUATION REQUIREMENTS**

Minimum Major GPA	Minimum Overall GPA
2.500	2.250

Roadmap

Semester One		Credit Hours: 15
COMM 15000	Introduction to Human Communication	3
ENGR 20005	Introduction to Cybersecurity Engineering	3
MATH 12002	Analytic Geometry and Calculus I	5
UC 10097	Destination Kent State: First Year Experience	1
Kent Core Requirement		3
Semester Two		Credit Hours: 16
CS 23022	Discrete Structures for Computer Science	3
MATH 12003	Analytic Geometry and Calculus II	5
PHY 23101	General University Physics I	5
Kent Core Requirement		3
Semester Three		Credit Hours: 16
ENGR 27100	Fundamentals of Operating Systems for Engineering	3
MATH 32051	Mathematical Methods in The Physical Sciences I	4
PHY 23102	General University Physics II	5
Computer Programming Elective		4
Semester Four		Credit Hours: 16
CS 23001	Computer Science II: Data Structures and Abstraction	4
ENGR 20000	Professional Development in Engineering	1
ENGR 26301	Networking Hardware I	4
ENGR 35500	Signals and Circuits	3
ENGR 35501	Signals and Circuits Laboratory	1
Kent Core Requirement		3
Semester Five		Credit Hours: 15
ENG 30062	Principles of Technical Writing	3
ENGR 36302	Networking Hardware II	3
ENGR 36337	Information Technology Security	3
MATH 30011	Basic Probability and Statistics	3
Kent Core Requirement		3
Semester Six		Credit Hours: 15
CS 47221	Introduction to Cryptology	3
ENGR 35550	Law and Ethics for Engineers	3
ENGR 46300	Network Security	3
ENGR 47200	Systems Engineering	3
Kent Core Requirement		3
Semester Seven		Credit Hours: 15
CS 47207	Digital Forensics	3
ENGR 46312	Wireless Network and Telecommunication Systems	3
ENGR 48099	Engineering Capstone I	3
Kent Core Requirement		3
Kent Core Requirement		3
Semester Eight		Credit Hours: 15
ENGR 33320	Applied Embedded Systems I	3
ENGR 46316	Server Administration and Configuration I	3
ENGR 48199	Engineering Capstone II	3
Major Elective		3
Kent Core Requirement		3
Minimum Total Credit Hours:123		