

**NOT FOR USE FOR CURRICULAR COURSE CHANGES
REQUEST FOR PROGRAM IMPROVEMENTS**

NOTE: Changes to programs may require course changes, which must be processed electronically. Any questions should be directed to Associate Provost David Reinhold at 7-4564 or david.reinhold@wmich.edu

DEPARTMENT: CS and BIS
PROPOSED EFFECTIVE FALL YEAR: 2019

COLLEGE: CEAS and HCOB

PROPOSED IMPROVEMENTS: *Academic Program Proposed Improvements*

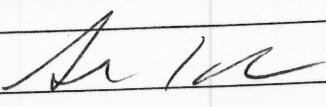
- New degree*
- New major*
- New curriculum*
- New concentration*
- New certificate*

- New minor*
- Deletion*
- Revised major
- Revised minor

- Admission requirements
- Graduation requirements
- Change in Title
- Transfer

Other (explain**) ** Other:

Title of degree, curriculum, major, minor, concentration, or certificate: Bachelor of Science in Cybersecurity

Chair, Department Curriculum Committee: 

Date 10/16/18

CHECKLIST FOR DEPARTMENT CHAIRS/DIRECTORS

- For new programs and other changes that have resource implications, the dean has been consulted.
- When appropriate, letters of support from department faculty are attached.
- When appropriate, letters of support from other departments in the same college are attached.
- When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
- The proposal has been reviewed by HIGE for possible implications for international student enrollment.
- The proposal is consistent with the departmental assessment plan, and identifies measurable learning outcomes for assessment.
- Detailed resource plan is attached where appropriate.
- All questions attached have been completed and supporting documents are attached.
- The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Chair/Director: 

Date 10/16/2018

CHECKLIST FOR COLLEGE CURRICULUM COMMITTEE

- The academic quality of the proposal and the faculty involved has been reviewed.
- Detailed resource plan is attached where appropriate.
- Consistency between the proposal and the relevant catalog language has been confirmed.
- The proposal has been reviewed for effect on students transferring from Michigan community colleges. Detailed information on transfer articulation must be included with undergraduate proposals.
- Consistency between the proposal and the College and department assessment plans has been confirmed.
- Consistency between the proposal and the College and department strategic plans has been confirmed.
- All questions attached have been completed and supporting documents are attached.
- The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Chair, College Curriculum Committee:

Date

**NOT FOR USE FOR CURRICULAR COURSE CHANGES
REQUEST FOR PROGRAM IMPROVEMENTS**

CHECKLIST FOR COLLEGE DEANS

- For new programs and proposed program deletions, the provost has been consulted.
- For new programs, letter of support from University Libraries Dean indicating library resource requirements have been met.
- When appropriate, letters of support from other college faculty and/or chairs are attached.
- When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
- The proposal has been reviewed for implications for accreditation, certification, or licensure.
- Detailed resource plan is attached where appropriate.
- All questions attached have been completed and supporting documents are attached.
- The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Dean:	Date
--------------	-------------

FOR PROPOSALS REQUIRING REVIEW BY:

GSC/USC; EPGC, GRADUATE COLLEGE, and/or FACULTY SENATE EXECUTIVE BOARD

<input type="checkbox"/> Return to Dean		
<input type="checkbox"/> Forward to:	Curriculum Manager: *needs review by	Date:
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Chair, GSC/USC:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Chair, EPGC:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Graduate College Dean:	Date:
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	Faculty Senate President:	Date
<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	*needs review by Provost:	Date

**NOT FOR USE FOR CURRICULAR COURSE CHANGES
REQUEST FOR PROGRAM IMPROVEMENTS**

1. Explain briefly and clearly the proposed improvement:

The BIS and CS departments, working with EUP, will offer an online Bachelor of Science in Cybersecurity degree.

All of the Cybersecurity BS classes will be delivered online so that no geographical barriers will restrict students from enrolling.

The BS in Cybersecurity has been designed to ensure that students will be able to meet Western Michigan University graduation requirements within 8 semesters. It has also been designed to meet all ABET accreditation criteria for Cybersecurity and similarly named computing programs and ABET accreditation will be pursued for this program once approved.

All proposed changes to the Cybersecurity BS curriculum must be approved by both the CS Department Faculty and the BIS Department CIS Faculty before moving forward in the Curriculum Improvement process in either College.

All three credit courses in this program will have 45 contact hours, while 4 credit courses will have 60 credit hours.

An overview of the required classes is attached [Appendix A].

2. Rationale. Give your reason(s) for the proposed improvement.

Cybersecurity is a field that has been growing and will continue to do so for years. Cybersecurity graduates are in high demand, and this online Bachelor of Science degree will give students the training and credentials necessary to secure employment in the field or continue to work toward more advanced degrees.

Based on market demand (see question 7):

- There are more cyber security positions open than the amount of Bachelor's degree completions indicating a strong market need
- Bachelor's degrees were requested in approximately 67-70% of cyber security job postings
- The starting and median salary for cyber security positions is high relative to many other occupations making it very desirable for potential students
- The number of cyber security jobs has increased steadily since 2001 and will continue to increase at a steady rate for the next ten years
- Distance program completions in information security are growing while non-distance program completion numbers are declining sharply
 - The flexibility this online program will have is key for potential non-traditional and military students

3. Effect on other colleges, departments, or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.

Faculty in CIS and CS have jointly developed this cross-disciplinary degree. Both the CS and BIS Departments support this degree as does each department's respective college (CEAS and HCOB). Moreover, this degree has the support of EUP.

Letters of support from the both BIS and CS department chairs, CEAS and HCOB deans, and EUP are attached to this proposal [Appendix B].

The University does not currently offer an undergraduate degree in the field of Cybersecurity.

4. Effect on your department's programs. Show how the proposed change fits with other departmental offerings.

The BS in Cybersecurity is being offered in addition to degrees offered by the CS and BIS departments. Anyone meeting undergraduate admissions criteria will be able to enroll in this program.

5. Alignment with college's and department's strategic plan, mission, and vision.

CS Department:

The B.S. in Cybersecurity aligns with the CEAS mission vision by preparing students for careers in an exciting and high-demand industry. Our students will learn to be ethical and professional leaders, and to answer challenges in our local and global communities to improve the well-being of society by protecting both individuals and organizations from malicious attackers.

BIS Department:

The B.S. in Cybersecurity reflects both our college's and department's dedication to student-centered programs. By offering an online, cross-disciplinary degree we meet another one of our major HCOB vision missions to be discovery-driven. Finally, this high-demand, innovative niche program will enable our students to succeed and make an impact in the fast-growing Cybersecurity field and the business world at large.

6. Effects on enrolled students: Are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students' time.

This program does not conflict with any current offerings. There are several courses that would be transferrable between this Bachelor of Science degree and the currently offered Bachelor of Science in Computer Science degree, allowing students, both current and future, flexibility in determining their preferred course of study, even after the start of one or the other of the programs. CIS students would also be able to choose their preferred course of study although this would need to be determined fairly early in their program coursework to avoid additional course work.

More details on scheduling and resource allocation are included in [Appendix C].

7. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?

Student Audience:

There are four potential student audiences for the proposed program:

- High school graduates looking to pursue a degree in cyber security
- Cyber security professionals that do not have a degree and are looking to get a Bachelor's in order to qualify for higher positions
- Career switchers from other areas of business, IT, or computer science
- Military personnel with related experience

Occupational Demand Data:

- There are approximately 326,250 jobs that involve a Bachelor's degree in cyber security in the U.S. with an additional 26,451 openings annually
- Relevant positions¹ to cybersecurity that involve a Bachelor's degree have grown 10.7% in the past 5 years and are projected to grow another 7.7% through 2022.
- In the last 12 months (September 2017 – September 2018) there were 127,590 unique job postings for cyber security related positions. Job postings have been on a steady incline from 2016-2018.
- In 2017, 67% of information security related job postings required at least a Bachelor's degree.
- The median salary for cyber security related positions was \$88,192 over the last 12 months with the 25th percentile workers earning \$66,476. This is an attractive starting wage for college graduates and a good median wage for professionals.

¹ Job titles used in analysis were Information Security Analyst, Database Administrator, Network and Computer Systems Administrator, and Computer Network Architect

U.S. Degree Demand Data:

- In 2017 there were 3,723 total Bachelor's degree completions, 2,500 (67%) of which were distance offered programs
- Demand for Bachelor's degrees in cybersecurity increased rapidly until a dip occurred in 2015-2016 due to the closure of ITT Technical Institute. Completions started to rise again in 2017. Online completes have grown above 2013 numbers but non-distance completes have not recovered back to that level yet.
- Although 118 schools offer Bachelor's degrees only 42 offer distance programs which, on a national level, shows that the market isn't too saturated for online programs at this point
- There are more annual openings than degree completions in the cyber security field in Michigan

The full marketing research report from EUP can be found in [Appendix F].

8. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. If proposing a new program, include a letter and/or email of support from the university libraries affirming that the library resource issues have been reviewed. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)

The Bachelor of Science in Cybersecurity will be offered completely online. EUP will provide resources to support the program to include an additional faculty line for each department. EUP will also offer the necessary online support in terms of course development assistance and technology. Both CEAS and HCoB deans also support the allocation of resources for this new Bachelor of Science degree.

Course offerings and sequences, as well as resource allocations are detailed in [Appendix C].

Letters of support for the Bachelor of Science in Cybersecurity from CEAS, EUP, HCoB, BIS, and CS are included in [Appendix B].

9. List the learning outcomes for the revised or proposed major, minor, or concentration. The department will use these outcomes for future assessments of the program.

ABET criteria for Cybersecurity and similarly named computing programs specify the following learning outcomes, which will be used to assess this curriculum.

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. An ability to apply security principles and practices to the environment, hardware, software, and human aspects of a system.
7. An ability to analyze and evaluate systems with respect to maintaining operations in the presence of risks and threats.

A detailed table that outlines how each course meets ABET criteria is included in [Appendix D].

10. Describe how this change is a response to assessment outcomes that are part of a department or college assessment plan or informal assessment activities.

Market research (see question 7) shows that there is a strong market for job candidates with a Bachelor of Science degree in Cybersecurity.

11. (Undergraduate proposals only) Describe in detail how this change affects transfer articulation for Michigan community colleges. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.

This program will not affect any current articulation agreements. Articulation agreements with community colleges relating to specific course transfer equivalencies with required Bachelor of Science in Cybersecurity courses will be agreed upon individually between Western Michigan University and the Community College in question as is usual.

12. Please offer both "Current Catalog Language" and "Proposed Catalog Language" if there is to be a change in the catalog description for a given program. For the "current" language, please copy and paste relevant language from the most current catalog and for the "proposed" language, please share the exact proposed new catalog language. As possible, bold or otherwise note the key changes in the new proposed catalog language.

The Bachelor of Science in Cybersecurity is an interdisciplinary online offering concentrating in cybersecurity. This degree is offered completely online. Students do not need to attend classes at the main or any regional campuses to earn the degree. Undergraduate credit is earned for all passing classes.

B.S. in Cybersecurity		
Course Number	Name	Credits
1000-level Courses		
CYCS 1110	Computer Programming 1	4
CYCS 1120	Computer Programming 2	4
CYCS 1200	Programming in C for Cybersecurity	3
CYCS 1310 **	Foundations of Cybersecurity	4
SubTotal		15
2000-level Courses		
CYIS/CYCS 2110 **	Cryptology Concepts and Techniques	3
CYCS 2230	Basic Computer Organization	3
CYIS/CYCS 2310	Ethics and Impacts	3
CYIS 2710	Windows System Administration	3
CYIS 2910	Linux System Administration	3
SubTotal		15
3000-level Courses		
CYIS 3110 **	Cybersecurity Data Analytics	3
CYCS 3240	Secure Systems Programming Concepts	3
CYIS 3600	Secure Systems Analysis and Design	3
CYIS 3660	Cybersecurity Management Principles	3
CYIS 3900	Secure Web Applications and Technologies	3
CYIS 3910	Network+	3
SubTotal		18
4000-level Courses		
CYCS 4710	Security+	3
CYCS 4540	Operating Systems for Cybersecurity	3

CYIS 4600	Secure Database Management Systems	3
CYIS/CYCS 4910	Cybersecurity Capstone Project 1	3
CYIS/CYCS 4920	Cybersecurity Capstone Project 2	2
SubTotal		14
Total Credits (without MATH)		52
Total Credits		62
** Math Requirements (10 credits). However, Pre-Calculus proficiency is expected either via MATH 1180 - Precalculus Mathematics or equivalent OR the appropriate SAT score.		

A Master Syllabus for each course can be found in [Appendix E].