

Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program: Cybersecurity and Network Management
Academic Year of Report: 2022 and 2023 (covering Summer 2021 through Spring 2023)
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The Institutional Effectiveness website hosts a page for each program that displays assessment reports and information. All available biennial assessment and program review reports are located at the bottom of the program's page on our site. As a part of the biennial report process, we ask that you please review your page for completeness and accuracy, and indicate below the changes that need to be made in sections A-E.

Program page link: https://www.weber.edu/ie/Results/Network_Management_Technology.html

A. Mission Statement

Information is current; no changes required: Yes _____ No _____

The Cybersecurity and Network Management Department is committed to providing the highest quality undergraduate programs while preparing students to assume roles in decision making, leadership, research, and service to community and business.

The department assists students in developing, communicating, and applying knowledge for the technical and professional world as well as gaining a desire for lifelong learning.

B. Student Learning Outcomes

(Please include certificate and associate credential learning outcomes)

Information is current; no changes required: Yes _____ No _____

Certificates

At the end of their study at WSU, students completing the Cybersecurity Essentials Certificate of Proficiency will:

- Possess an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Possess an ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Possess an ability to communicate effectively in a variety of professional contexts.
- Possess an ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Possess an ability to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Possess an ability to support the delivery, use, and management of information systems within an information systems environment.

At the end of their study at WSU, students completing the Cybersecurity Essentials Certificate of Proficiency will:

At the end of their study at WSU, students completing the Network Technologies Certificate of Proficiency will:

- Possess an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Possess an ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Possess an ability to communicate effectively in a variety of professional contexts.
- Possess an ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Possess an ability to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Possess an ability to support the delivery, use, and management of information systems within an information systems environment.

At the end of their study at WSU, students completing the Network Security Technology Certificate of Proficiency will:

- Possess an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Possess an ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Possess an ability to communicate effectively in a variety of professional contexts.
- Possess an ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Possess an ability to support the delivery, use, and management of information systems within an information systems environment.

Associate Degree

At the end of their study at WSU, students completing the Associate of Applied Science in Cybersecurity and Network Management will:

- Possess an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Possess an ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Possess an ability to communicate effectively in a variety of professional contexts.
- Possess an ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Possess an ability to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Possess an ability to support the delivery, use, and management of information systems within an information systems environment.

Bachelor Degree

At the end of their study at WSU, students completing the Bachelor of Science in Cybersecurity and Network Management will:

- Possess an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Possess an ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.
- Possess an ability to communicate effectively in a variety of professional contexts.
- Possess an ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Possess an ability to function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.
- Possess an ability to support the delivery, use, and management of information systems within an information systems environment.

C. Curriculum Grid

(Please review your current curriculum grid and verify that at least one course has been identified for each outcome in which you expect your students to demonstrate the desired competency of a graduating student. This could be shown in a variety of ways: classroom work, clinical or internship work, a field test, an ePortfolio, etc. You may request access to the Google Sheet on our site if that is easiest, or we can make the updates. Please reach out to ois@weber.edu if you wish to have access)

Information is current; no changes required: Yes **No**

	An ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	An ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.	An ability to communicate effectively in a variety of professional contexts.	An ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	An ability to function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.	An ability to support the delivery, use, and management of information systems within an information systems environment.
NET 1400 Introduction to Cyber Defense and Ethics						
NET 2200 Cybersecurity and						

System Fundamentals						
NET 2210 Linux Systems Administration	I	I			I	I
NET 2300 Introduction to LAN Management	I	I				R
NET 2310 Network Server Administration	R	R		R		R
NET 2415 Cisco TCP/IP Routing Protocols and Router	R	R				R
NET 2435 Cisco Advanced LAN and WAN Switching and Routing Theory and Design	R	R				R
NET 2500 Practical Cybersecurity Infrastructure	R			R	R	R
NET 2510 Cyberethics			R	R		
NET 3210 Cloud Architecture and Security	R	R		R		R
NET 3300 Advanced LAN Security Management	R	R	R	R		R

NET 3550 Supervising Information Technology	R		R			
NET 3710 Switching and Transmission Network Systems Management	R	R			R	R
NET 3720 Wireless Networking and Security	R	R		R		R
NET 3730 Survey of Information Security Policies			R	E		
NET 4700 Data and Voice Network Design	E	E	E	E	E	E
NET 4740 Security Vulnerabilities and Intrusion Mitigation	E	E	E	E		E
NET 4760 Network Management Technology Internship	E	E	E	E	E	E
NET 4790 Network Management Technology Senior Project	E	E	E	E		E

I = Introduced, E = Emphasized, R = Reinforced						
Updated Fall 23						

D. Program and Contact Information

Information is current; no changes required: Yes No

The Cybersecurity and Network Management program is in the School of Computing in the College of Engineering Applied Science and Technology (EAST) at Weber State University (WSU). Students have the following degree options:

- o Bachelor of Science in Cybersecurity and Network Management, Associate of Applied Science in Cybersecurity and Network Management, Minor in Cybersecurity and Network Management, Network Security Technology Certificate of Proficiency, Network Technologies Certificate of Proficiency, and Cybersecurity Essentials Certificate of Proficiency.
- o Students learn to install, configure, and secure data and voice networks. Students will learn how to install, administer, and secure operating systems in diverse virtual and physical systems. Industry leading software and hardware from partners that include Microsoft, Amazon, VMWare, and Cisco will be used for interactive lab work to introduce, reinforce, and evaluate key concepts. Students will explore cyber ethics, cyber policies, compliance, and risk management. Students will participate in an internship in an information technology department or complete a rigorous cybersecurity and network management related project.
- o Graduates in this major may work in the cybersecurity and information technology industry. Jobs may focus on local area networks, fiber optics, firewalls, router configuration protocols, cloud environments, online databases, wireless networking, voice technology, and network security.

Contact information:

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E. Assessment Plan

We have traditionally asked programs to report on outcome achievement by students at the course level. We are encouraging programs to consider alternative assessment approaches and plans that are outcome-based as opposed to course-based, though course-based assessment can continue to be used. A complete assessment plan should include:

- a timeline (which courses or which outcomes will be assessed each year),
- an overall assessment strategy (course-based, outcome-based, reviewed juries, ePortfolio, field tests, etc.)
- information about how you will collect and review data
- information about how the department/program faculty are engaged in the assessment review.

Information is current; no changes required: Yes No

Course	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028
NET 2210 Linux Systems Administration	CA/RI	Imp			CA/RI	Imp
NET 2415 Cisco TCP/IP Routing Protocols and Router		CA/RI	Imp			CA/RI
NET 2435 Cisco Advanced LAN and WAN Switching and Routing Theory and Design		CA/RI	Imp			CA/RI
NET 3300 Advanced LAN Security Management			CA/RI	Imp		
NET 4740 Security Vulnerabilities and Intrusion Mitigation			CA/RI	Imp		
NET 1400 Introduction to Cyber Defense and Ethics				CA/RI	Imp	
NET 2300 Introduction to LAN Management	Imp			CA/RI	Imp	
NET 2310 Network Server Administration	Imp			CA/RI	Imp	
NET 3210 Cloud Architecture and Security				CA/RI	Imp	
NET 3550 Supervising Information Technology	Imp			CA/RI	Imp	
NET 3710 Switching and Transmission Network Systems Management	Imp			CA/RI	Imp	

NET 3730 Survey of Information Security Policies	Imp			CA/RI	Imp	
NET 4700 Data and Voice Network Design	Imp			CA/RI	Imp	
NET 4740 Security Vulnerabilities and Intrusion Mitigation	Imp			CA/RI	Imp	
NET 2200 Cybersecurity and System Fundamentals					CA/RI	Imp
NET 2500 Practical Cybersecurity Infrastructure					CA/RI	Imp
NET 3720 Wireless Networking and Security					CA/RI	Imp
NET 4760 Network Management Technology Internship					CA/RI	Imp
NET 4790 Network Management Technology Senior Project					CA/RI	Imp
CA/RI – Course Assessment and Recommended Improvements						
Imp – Implement Improvements						

Each course is reviewed by the course committee that is assigned at the department level. Assignments, assessments, and other class activities are tied to learning outcomes identified on the curriculum grid. The instructors of the course will use grading information from these selections to provide quantitative data when possible. Evidence of learning for a specific student learning outcome is deemed successful if the associated assessment measure is 80% or above. The curriculum committee will use the measured outcomes, feedback from the instructors, and student feedback to identify possible areas of improvement. In the case of major curriculum changes, feedback from the program’s Industry Advisory Committee may be sought.

New: [High Impact Educational Experiences](#) in the Curriculum

In response to the recent USHE requirement that all students have at least 1 HIEE in the first 30 credit hours and 1 HIEE in the major or minor we are asking programs to map HIEEs to curriculum using a traditional curriculum grid. This helps demonstrate how and where these goals are accomplished.

Courses	Department/Program use of High Impact Educational Experiences				
	<u>HIEE 1</u>	<u>HIEE 2</u>	<u>HIEE 3</u>	<u>HIEE 4</u>	<u>Etc...</u>
NET 2500 – Practical Cybersecurity Infrastructure	Students will complete a practical assessment using learning objectives from several lower division courses. This assessment requires the combination of skills and knowledge to configure a functioning and secure network.				
NET 4760 – Network Management Technology Internship	Students will spend the semester working in an IT administrator, cyber security, or network management type role. Student success will be measured by completion of outcomes agreed upon by their supervisor. Professional communication with the instructor and the student’s supervisor is also evaluated.				
NET 4790 – Network Management Technology Senior Project	Students will work with supervising faculty or work supervisor to design and implement an IT administration, cyber security, or network management type project. The project will require high level skills from multiple courses in the program. Student success will be measured by the success of the project meeting its outcomes and the professional communication of the student.				

F. Student Achievement

Please come back to this section later. The dashboard is being updated and is not yet on Site Manager. OIE will send out an email when it is ready.

Percent and number of students completing degrees within 2 years of achieving 90+ credit hours (or just time to graduation for graduate programs) and a reflection on that metric.

Here are instructions on how to access this information:

1. Log into the eWeber portal
2. Search for, and select the app, "Report Gallery"
3. Agree to the FERPA warning
4. In the Report Gallery search for Program Review Undergraduate - you can enter that text into the search bar or you can scroll down the list of dashboards until you find it.

5. Select the tab at the top labeled "Time to Grad" at the top of the page.
6. Select your Program Unit and Program Level on the right side
7. Select Priority 1 under Priority

You should now be in the right settings for understanding your program's time to graduation. Please reflect on what you are seeing, discuss any highlights or concerns, and outline what initiatives the program is doing to address the numbers shown. If you require assistance or have questions, please email oi@weber.edu. You may use a screenshot of the information shown in the dashboard as a part of your report.

G. Evidence of Learning

There are a variety of ways in which you can choose to show evidence of learning, including the traditional Evidence of Learning Rubric, the updated Evidence of Learning worksheet, a narrative describing your assessments and evidence of student learning, or other tools such as ePortfolios, Signature Assignments, juried reviews, and so on, or a combination of any of these.

Whichever method you choose, please include:

1. Each learning outcome addressed in the course, and an interpretation of the outcomes as necessary to help outside reviewers understand the learning goals
2. The methods used to assess learning for each outcome – ideally, each outcome will be measured with at least two different methods, e.g., multiple quiz questions and a signature assignment, multiple exam questions and lab reports, course discussions and homework assignments, etc.
3. The threshold of acceptable performance – preferably a multi-stepped threshold, such as “80% of students will score 80% or better on the set of quiz questions” – and brief explanation for why that target was selected
4. The results of the assessment for each outcome. If possible, include specifics such as the number of students who meet, exceed, or fall short of the threshold.
5. A reflection on, or interpretation of, the findings. For example, if 100% of students correctly answer all quiz questions, might they need to be too easy?
6. A plan of action to address the findings, even if the threshold was met, and/or reflection on changes made as a result of (or in the interim since) the last biennial report.
7. How you plan to monitor and assess the success of changes you will make/have made (“close the loop”).

If individual faculty who provide data or participate in the assessment of these courses would like feedback or support from GEIAC or the Office of Institutional Effectiveness, provide their names and contact information here:

Types of Assessment

- 1) Course-based assessment
 - a. This is the format we have traditionally suggested programs use for assessment. The familiar ‘evidence of learning worksheets’ are included in the template and can also be accessed from the IE website.
- 2) Outcome-based assessment
 - a. Moving from course-based to outcome-based assessment has the potential for programs to gather and reflect upon data that are more meaningful, and to connect assessment findings from throughout the program. The approach may be much easier for associates and certificate programs where only select students in classes are earning the credential. For more information email (oiie@weber.edu)
 - b. Reporting options include:
 - i. A traditional evidence-of-learning [worksheet](#) with an outcome (across multiple courses) as the focus (instead of a course with multiple outcomes).
 - ii. A report that is more [narrative-based](#).
 - iii. Other tools such as an ePortfolio in which key or signature assignments have been identified by the faculty, and uploaded by the student with their reflection. The key or signature assignments are aligned to student learning outcomes. (ePortfolio is an excellent assessment tool for certificates and associate degrees.)
 - iv. There are other approaches such as juried reviews, physical portfolios, field tests, etc.
- 3) General Education course assessment needs to continue to be reported at the course level using either the [traditional template](#) or a more [narrative-based format](#). See the [Checklist and Template](#) page for area-specific worksheets as well.

Note: if you cannot download templates directly from this document, please visit our [template page](#) for downloads.

Appendix A

Most departments or programs receive a number of recommendations from their Five/Seven-Year Program Review processes. This page provides a means of updating progress towards the recommendations the department/program is enacting.

Date of Program Review: 19-20	Recommendation	Progress Description
Recommendation 1	Text of recommendation	
Concerns with faculty workload		The number of School of Computing faculty has increased every year.

Additional narrative:

Appendix B

Please provide the following information about the full-time *and adjunct faculty* contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five-Year Program Review document that is shared with the State Board of Regents.

Faculty Headcount	2021-22	2022-23	2023-24	Notes
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)				
Full-time Tenured	1	1	1	
Full-time Non-Tenured (includes tenure-track)	1	1	1	
Part-time and adjunct	0	0	0	
With Master's Degrees				
Full-time Tenured	0	0	0	
Full-time Non-Tenured	2	2	3	
Part-time and adjunct	2	2	3	
With Bachelor's Degrees				
Full-time Tenured	0	0	0	
Full-time Non-tenured	0	0	1	
Part-time and adjunct	1	1	1	
Other				
Full-time Tenured				
Full-time Non-tenured				
Part-time				
Total Headcount Faculty	7	8	10	

Appendix C

Please respond to the following questions.

- 1) Looking back at your previous biennial report where you identified strategies for improvement, what progress has been made in implementing improvements?
 - a. The program name change to Cybersecurity and Network Management is very indicative of the focus of the program. The need for information technology employees with cybersecurity knowledge is at an all time high in the Utah and National job market. The efforts to secure the NSA designation as a Center of Academic Excellence in Cyber Defense Education for the University was worth the effort. We are now implementing a grant that we were eligible for only with the designation.
 - b. The program's CE offerings have expanded to NET 1400, NET 2200, NET 2210, and NET 2300. The School of Computing is currently implementing two grants that have objectives to help strengthen the CE pipeline. One anticipated outcome of more traditional students enrolling is an increase in diversity. The program name change appears to have higher appeal to international students as well, but that is unmeasured feedback from advisors.
 - c. Feedback from advisors and students indicate that curriculum changes have made course selection easier. The School of Computing is also working together to eliminate redundancies in lower division offerings where multiple programs have similar courses.
- 2) Please take a few minutes to review the new DFWI dashboard in the Report Gallery. This dashboard allows you to see the percentage of students in each course who earn a D+, D, D-, E, W, UW, or NC grade. The data can be filtered by several parameters. Reflect on the DFWI rates overall and of your underserved minority students versus your Caucasian students:
 - a. What are you seeing?

The lower division courses have a higher rate of non-passing grades with no course over 20%. The upper-division courses all seem to be at an acceptable level of 10% or under. FTF courses have a much better pass rate than online. We have been doing more hybrid which is popular with students, the pass rates are between FTF and online. There are still a few issues with the data being displayed correctly but it seems solid enough general feedback.
 - b. What concerns you?

The student demand for flexibility does seem to decrease the rate of success. The online sections of courses always fill up before FTF or hybrid with School of Computing options. The sample size of NET students is relatively small, but it does look like non-white students have a higher non-pass rate.

c. What additional data could be beneficial?

The program name change has led to issues with using data. Our new program isn't showing up yet and I don't see a way to combine two programs on the undergraduate reports.

3) We have invited you to re-think your program assessment. What strategies are you considering? What support or help would you like?

The Cybersecurity and Networking Management program will continue having ABET accreditation as the driving force as long as it meets Weber State's needs as well. The program will be required to do some extra assessment work for NSA CAE-CDE redesignation. The NSA is very interested in the career paths that students are prepared for.

Glossary

Student Learning Outcomes/Measurable Learning Outcomes

The terms ‘learning outcome’, ‘learning objective’, ‘learning competency’, and ‘learning goal’ are often used interchangeably. Broadly, these terms reference what we want students to be able to do AFTER they pass a course or graduate from a program. For this document, we will use the word ‘outcomes’. Good learning outcomes are specific (but not too specific), are observable, and are clear. Good learning outcomes focus on skills: knowledge and understanding; transferrable skills; habits of mind; career skills; attitudes and values.

- Should be developed using action words (if you can see it, you can assess it).
- Use compound statements judiciously.
- Use complex statements judiciously.

Curriculum Grid

A chart identifying the key learning outcomes addressed in each of the curriculum’s key elements or learning experiences (Suskie, 2019). A good curriculum:

- Gives students ample, diverse opportunities to achieve core learning outcomes.
- Has appropriate, progressive rigor.
- Concludes with an integrative, synthesizing capstone experience.
- Is focused and simple.
- Uses research-informed strategies to help students learn and succeed.
- Is consistent across venues and modalities.
- Is greater than the sum of its parts.

Target Performance (previously referred to as ‘Threshold’)

The level of performance at which students are doing well enough to succeed in later studies (e.g., next course in sequence or next level of course) or career.

Actual Performance

How students performed on the specific assessment. An average score is less meaningful than a distribution of scores (for example, 72% of students met or exceeded the target performance, 5% of students failed the assessment).

Closing the Loop

The process of following up on changes made to curriculum, pedagogy, materials, etc., to determine if the changes had the desired impact.

Continuous Improvement

An idea with roots in manufacturing, that promotes the ongoing effort to improve. Continuous improvement uses data and evidence to improve student learning and drive student success.

Direct evidence

Evidence based upon actual student work; performance on a test, a presentation, or a research paper, for example. Direct evidence is tangible, visible, and measurable.

Indirect evidence

Evidence that serves as a proxy for student learning. May include student opinion/perception of learning, course grades, measures of satisfaction, participation. Works well as a complement to direct evidence.

HIEE – High Impact Educational Experiences

Promote student learning through curricular and co-curricular activities that are intentionally designed to foster active and integrative student engagement by utilizing multiple impact strategies. Please see <https://weber.edu/weberthrives/HIEE.html>