

Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program: Network Management Technology
Academic Year of Report: 2020/21 (covering Summer 2019 through Spring 2021)
Date Submitted: November 15, 2021
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We have updated the Institutional Effectiveness website, which includes an update for each program page. All Biennial Assessment and Program Review reports will now be available on a single page. Please review your page for completeness and accuracy, and indicate on the list below the changes that need to be made. Access your program page from the top-level [results](#) page. Select the appropriate college and then your program from the subsequent page.

A. Mission Statement

Information is current; no changes required.

Update if not current:

B. Student Learning Outcomes

(please note the addition of certificate and associate credential learning outcomes)

Information is current; no changes required.

Certificates section:

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

- Possess an ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution
- Possess an ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology
- Possess an ability to communicate effectively with a range of audiences about technical information
- Possess an ability to make informed judgements in computing bases upon legal and ethical principles
- Possess an ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables

Computer Science learning outcomes associated with the Cybersecurity Essentials Certificate of Proficiency:

- Apply knowledge of computing and mathematics
- Analyze problems, identify, and define requirements
- Design, implement, & evaluate computer-based systems
- Professional, ethical, security, and social behavior
- Analyze local and global impact of computing

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

- Possess an ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution

- Possess an ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology
- Possess an ability to communicate effectively with a range of audiences about technical information
- Possess an ability to make informed judgements in computing bases upon legal and ethical principles
- Possess an ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables

Computer Science learning outcomes associated with the Network Security Technology Certificate:

- Apply knowledge of computing and mathematics
- Analyze problems, identify, and define requirements
- Design, implement, & evaluate computer-based systems
- Professional, ethical, security, and social behavior
- Analyze local and global impact of computing

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

- Possess an ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution
- Possess an ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology
- Possess an ability to communicate effectively with a range of audiences about technical information
- Possess an ability to make informed judgements in computing bases upon legal and ethical principles
- Possess an ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables

Computer Science learning outcomes associated with the Network Technologies Certificate:

- Apply knowledge of computing and mathematics
- Analyze problems, identify, and define requirements
- Design, implement, & evaluate computer-based systems
- Professional, ethical, security, and social behavior
- Analyze local and global impact of computing
- Engage in continuing professional development
- Use current techniques, skills, and tools
- Apply mathematics, algorithms, and computer theory
- Apply design and development principles

AAS Section:

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

- Possess an ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution
- Possess an ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology
- Possess an ability to communicate effectively with a range of audiences about technical information
- Possess an ability to make informed judgements in computing bases upon legal and ethical principles
- Possess an ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables

Computer Science learning outcomes associated with the AAS in Network Management Technology:

- Applying knowledge of computing and mathematics
- Analyze problems, identify, and define requirements
- Design, implement, & evaluate computer-based systems
- Professional, ethical, security, and social behavior
- Analyze local and global impact of computing
- Engage in continuing professional development
- Use current techniques, skills, and tools
- Apply mathematics, algorithms, and computer theory

Web and User Experience learning outcomes associated with the AAS in Network Management Technology:

- Technology Knowledge and Skills
- Implementation of Decision-Making and Problem-Solving Skills
- Knowledge of ethics and professionalism
- Produce industry-standard websites and multimedia projects

Professional Sales learning outcomes associated with the AAS in Network Management Technology:

- Supervision skills
- Interpersonal relationship Skills

- Planning and organization skills

Electronics Engineering Technology learning outcomes associated with the AAS in Network Management Technology:

- An ability to select and apply the knowledge, techniques, skills, and modern tools to analyze AC, DC, digital, and microprocessor based circuits
- An ability to conduct measurements using modern lab equipment and analyze and interpret experimental results in lab reports, using the results to make improvements
- An ability to identify, analyze, and solve problems with electronic circuits or electronic systems

BS Section:

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

- Possess an ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution
- Possess an ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology
- Possess an ability to communicate effectively with a range of audiences about technical information
- Possess an ability to make informed judgements in computing bases upon legal and ethical principles
- Possess an ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables

C. Curriculum (please note, we are using Google Sheets for this section so that updates are easier to make)

___ **Information is current; no changes required.**

Update if not current (you may request access to the Google Sheet if that is easiest, or we can make the updates):

(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.)

	An ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution	An ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology	An ability to communicate effectively with a range of audiences about technical information	An ability to make informed judgements in computing bases upon legal and ethical principles	An ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables
CS 1030 Foundations of Computer Science			I	I	I
NET 2200 Microcomputer Operating Systems	I	I			
NET 2210 Linux Systems Administration	R	R			
NET 2300 Introduction to LAN Management	I	I			
NET 2415 Cisco TCP/IP Routing Protocols and Router Configuration	R	R			
NET 2435	R	R			

Cisco Advanced LAN and WAN Switching and Theory and Design					
NET 3300 Advanced LAN Security Management	R	R	R	R	
NET 3310 Network Server Administration	R	R	R	R	
NET 3550 Supervising Information Technology			R		R
NET 3710 Switching and Transmission Network Systems Management	R	R			
NET 3715 Transmission Network Applications	R	R			
NET 3720 Advanced Transport Media	R	R		R	
NET 3730 Cyber Policy and Ethics				R	
NET 4700 Data and Voice Network Design	E	E	E		E
NET 4740 Security Vulnerabilities and Intrusion Mitigation	E	E	E	E	E
NET 4760 Network/Telecommunications Internship	E	E	E	E	E
NET 4790 Network/Telecommunications Senior Project	E	E	E	E	E

D. Program and Contact Information

 Information is current; no changes required.

Update if not current:

The Network Management Technology major 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:

- Bachelor of Science in Network Management Technology, Associate of Applied Science in Network Management Technology, Minor in Network Management, Technology Certificate in Network Security Technologies, Technology Certificate in Network Technologies, Technology Certificate in Cybersecurity Essentials
- Students learn to maintain voice and data network systems. For voice systems, students design, install and manage phone systems, as well as practice programming switches for telephone applications in a lab situation. For data systems, students learn Linux, Microsoft, and Cisco; the Internet, and network security; install software and configure data systems to operate efficiently; explore cyber ethics and policies; and participate in an internship in a corporate network department.
- Graduates in this major may work in the network industry and includes working with a voice network, a data network, or a converged network. Jobs may focus on local area networks, fiber optics, switches, firewalls, router configuration protocols, microwave and satellite communications, online databases, telephone systems, voice technology, and network security.

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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 will 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, and information about how the department/program faculty are engaged in the assessment review.

 Information is current; no changes required.

Update if not current:

Student Outcome	Course	Assessment Instrument	Expected Level of Achievement
An ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution	NET 4760/90	Employer Evaluation Form (EEF) Q. 12-13	Satisfactory or above
	NET 4740	Final Project, Written Report	Score of 80% or above
	NET 4700	Midterm Exam	Score of 80% or above
An ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology	NET 4760/90	EEF Q. 14-15	Satisfactory or above
	NET 4740	Final Project, Implementation	Score of 80% or above
	NET 4700	Midterm Exam	Score of 80% or above
An ability to communicate effectively with a range of audiences about technical information	NET 4760/90	EEF Q. 10-11	Satisfactory or above
	NET 4740	Final Project Written Report and Implementation	Score of 80% or above
	NET 4700	Semester Project	Score of 80% or above
An ability to make informed judgements in computing bases upon legal and ethical principles	NET 4760/90	EEF Q 15-16	Satisfactory or above
	NET 4740	Reading Critiques	Score of 80% or above
An ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables	NET 4760/90	EEF Q. 17-22, 24-27	Satisfactory or above
	NET 4740	Group Project	Score of 80% or above
	NET 4700	Group Project Team Component	Score of 80% or above

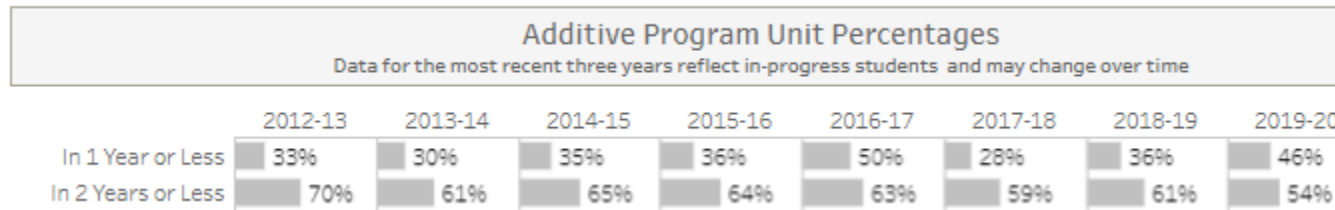
5-Year Course Assessment Schedule

2017	2018	2019	2020	2021	2022
2415		2200	2300	2435	2415
3310	3710		3300	3550	3310
2210	3715	3720		3730	2210
4740	4700	4760/4790	4740	4700	4760/90

F. Student Achievement

- i. Percent of students completing degrees after 90 credit hours within 2 years and a reflection on that metric (this information can be accessed on the Program Review Undergraduate dashboard – tab labeled, ‘Time to Grad from 90CH – please reach out to ojc@weber.edu if you need help with this metric). What department initiatives are in place to address this?

Example:



From 2014-15 through 2018-19, this program averages a 62.4% completion within 2 years of 90CH

Network Management Technology is targeting retention with use of Starfish and contacting students when instructors raise flags. The program has also implemented changes to curriculum to ease prerequisite chains and open scheduling options for students. Challenge exams are made available for certain lower division classes for students with relevant non-articulating transfer credits or industry experiences.

Evidence of Learning

There are varieties of ways in which departments can choose to show evidence of learning.

- 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. The critical pieces to include are:
 - i. learning outcomes addressed in the course,
 - ii. method(s) of measurement used,
 - iii. threshold for ‘acceptable – that is, the target performance,
 - iv. actual results of the assessment,
 - v. interpretation/reflection on findings,
 - vi. the course of action to be taken based upon the interpretation,
 - vii. how that action will be evaluated.
- 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 (gniklason@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.

A. Evidence of Learning: Courses within the Major

Student Outcome	Course	Assessment Instrument	Expected Level of Achievement	Results	Interpretation of Findings	Action Plan/Use of Results	“Closing the Loop”
An ability to analyze a problem, and to identify and define the computing requirements appropriate to its solution	NET 4760/90	Employer Evaluation Form (EEF) Q. 12-13	Satisfactory or above	90%	Employers felt students performed well, student course work met expectations	No curricular or pedagogical changes needed at this time	
	NET 4740	Final Project, Written Report	Score of 80% or above	88.8%			
	NET 4700	Midterm Exam	Score of 80% or above	96.6%			
An ability to design, implement, and evaluate a computer-based solution to meet a given set of computing requirements in the context of network technology	NET 4760/90	EEF Q. 14-15	Satisfactory or above	100%	Employers felt students performed well, student course work met expectations	No curricular or pedagogical changes needed at this time	
	NET 4740	Final Project, Implementation	Score of 80% or above	92.1%			
	NET 4700	Midterm Exam	Score of 80% or above	96.6%			
An ability to communicate effectively with a range of audiences about technical information	NET 4760/90	EEF Q. 10-11	Satisfactory or above	87%	Employers felt students performed well, student course work met expectations	No curricular or pedagogical changes needed at this time	
	NET 4740	Final Project Written Report and Implementation	Score of 80% or above	88.8%, 95.0%			
	NET 4700	Semester Project	Score of 80% or above	93%			
An ability to make informed judgements in computing bases upon legal and ethical principles	NET 4760/90	EEF Q 15-16	Satisfactory or above	100%	Employers felt students performed well, student course work met expectations	No curricular or pedagogical changes needed at this time	
	NET 4740	Reading Critiques	Score of 80% or above	83.3%			
An ability to function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables	NET 4760/90	EEF Q. 17-22, 24-27	Satisfactory or above	87%	Employers felt students performed well, student course work met expectations	No curricular or pedagogical changes needed at this time	
	NET 4740	Group Project	Score of 80% or above	93.75%			
	NET 4700	Group Project Team Component	Score of 80% or above	93%			

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:	Recommendation	Progress Description
Recommendation 1	Text of recommendation	
Watch faculty workload		The School of Computing is hiring additional faculty for next year (2022-2023)

Additional narrative:

The only issue raised in both the ABET accreditation from Oct 2020 and the WSU Accreditation review from Feb 2021 relates to faculty and workload. The School of Computing in which the Network Management Technology program is housed will be doing another round of hiring this year.

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	2018-18	2019-20	2020-21
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured			
Full-time Non-Tenured (includes tenure-track)	2	2	2
Part-time and adjunct			
With Master's Degrees			
Full-time Tenured			
Full-time Non-Tenured	2	2	2
Part-time and adjunct	1	1	1
With Bachelor's Degrees			
Full-time Tenured			
Full-time Non-tenured	1	1	1
Part-time and adjunct	1	1	1
Other			
Full-time Tenured			
Full-time Non-tenured			
Part-time			
Total Headcount Faculty			
Full-time Tenured			
Full-time Non-tenured	5	5	5
Part-time	2	2	2

Please respond to the following questions.

- 1) Review and comment on the trend of minority students enrolling in your classes (particularly lower-division, GEN Ed) and in your programs.
 - a. The NMT program has not seen a major change in ethnicity diversity in the past five years. One measurable change was the discontinuation of funding from Saudi Arabia for students to seek degrees abroad. This led to a decrease in non-resident students in the NMT program.
- 2) What support (from enrollment services, advising, first-year transition office, access & diversity, etc.) do you need to help you recruit and retain students?
 - a. Access to reliable data tracking student retention through the program.
- 3) We have invited you to re-think your program assessment. What strategies are you considering? What support or help would you like?
 - a. With ABET accreditation being so outcome focused we would like to avoid a duplication of work from implementing another strategy.
- 4) Finally, we are supporting our Concurrent Enrollment accreditation process. Does your program offer concurrent enrollment classes? If so, have you been able to submit the information requested from the Concurrent Enrollment office?
 - a. Yes, we have two courses: NET 2200 and NET 2300. Yes, we provided the office with the information they requested.

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>