Date of request: 08-OCT-2019
Request ID: A-2019-CS-32
College: A
Department: CS
Initiator name: Jason Johnson
Initiator email: jason.e.johnson@wmich.edu
Proposed effective term: 202040
Does course need General Education approval?: N
Will course be used in teacher education?: N
If 5000 level course, prerequisites apply to: U
Proposed course data:
New Course CS 3550
New course selected: This new course is not seeking approval as a general education course.

1. Proposed course prefix and number:
   CS 3550

2. Proposed credit hours:
   3

3. Proposed course title:
   Network Fundamentals

4. Proposed course prerequisites:
   CS 1120

5. Proposed course corequisites:
   none

6. Proposed course prerequisites that may be taken concurrently (before or at the same time):
   none

7. Minimum grade for prerequisites (default grades are D for Undergrad and C for Grad):
   C

8. Major and/or minor restrictions:
   Not Applicable
9. List all the four-digit major and/or minor codes (from Banner) that are to be included or excluded:
none

10. Classification restrictions:
Not Applicable

11. List all the classifications (freshman, sophomore, junior, senior) that are to be included or excluded:
none

12. Level restriction:
Not Applicable

13. List the level (undergraduate, graduate) that is to be included or excluded.
Not Applicable

14. Do prerequisites and corequisites for 5000-level courses apply to undergraduates, graduates, or both?
Not Applicable

15. Is this a multi-topic course?
No

16. Proposed course title to be entered in Banner:
Network Fundamentals

17. Is this course repeatable for credit?
No

18. Is this course mandatory credit/no credit?
No

19. Select class type:
Lecture/Lab/Discussion

20. How many contact hours per week for this course?
3

A. Please choose Yes or No to indicate if this class is a Teacher Education class:
No

B. Please choose the applicable class level:
Undergraduate

C. Please respond Yes if this is a current general education course and/or a course being submitted for the new WMU Essential Studies program. Please respond No if it is neither.
No
D. Explain briefly and clearly the proposed improvement.
Create an undergraduate level computer networking course.

E. Rationale. Give your reason(s) for the proposed improvement. (If your proposal includes prerequisites, justify those, too.).
The ABET Computing Accreditation Commission has released new accreditation requirements for Computer Science programs. To maintain accreditation, the Department of Computer Science needs to cover Networking and Security in greater depth. This class will focus on both of those topics and help us to meet the new requirements.

CS 1120 is a prerequisite for this course because students in CS 3550 will be required to implement network applications, which requires the firm grounding in software development that students gain from completing CS 1120. It is unlikely that students without the skills developed in CS 1120 would be able to succeed in CS 3550.

F. List the student learning outcomes for the proposed course or the revised or proposed major, minor, or concentration. These are the outcomes that the department will use for future assessments of the course or program.
Students will be able to:
• Explain the fundamentals of network communication
• Explain network addressing (IPv4 and IPv6)
• Implement simple network applications
• Explain the usage and vulnerabilities of common network protocols
• Apply the concepts and fundamental principles of network security
• Explain the tools used in network reconnaissance
• Decode network packets to identify the protocols used and potential attacks

G. Describe how this curriculum change is a response to student learning assessment outcomes that are part of a departmental or college assessment plan or informal assessment activities.
This change is necessary to meet new ABET CAC requirements.

H. 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. None.

I. Effect on your department’s programs. Show how the proposed change fits with other departmental offerings.
This new course allows us to satisfy new ABET accreditation outcomes and is, therefore, a necessary change.

J. 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. If a required course will be offered during summer only, provide a
rationale. While students will be required to take this course, which has not been the case in the past, it will be offered in both Fall and Spring semesters each year. That being the case, scheduling will not be difficult, and the time required to complete a Bachelor of Science in Computer Science degree will not change.

K. 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? Estimated audience is all undergraduate CS students.

L. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? How often will course(s) be offered? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.) Offering this class will not require any additional faculty or advising resources.

M. With the change from General Education to WMU Essential Studies, this question is no longer used.

For courses requesting approval as a WMU Essential Studies course, a syllabus identifying the student learning outcomes and an action plan for assessing the student learning outcomes must be attached in the Banner Workflow system. Not Applicable

N. (Undergraduate proposals only) Describe, in detail, how this curriculum change affects transfer articulation for Michigan community colleges. For course changes, include detail on necessary changes to transfer articulation from Michigan community college courses. 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. The addition of this course will in no way restrict any curring transfer articulation agreements, and may add options for students to transfer credits.

O. Current catalog copy: N/A

P. Proposed catalog copy: This course examines the fundamentals of network communication. The course covers network addressing, protocols, and basic attacks against an organization’s network infrastructure as well as their mitigations. Students will learn to implement network applications and capture and analyze network traffic to monitor for potential attacks. Practical exercises and labs will be used during this course to allow the students to apply these concepts in real-world scenarios.
Department Curriculum Chair approver: Jason Johnson

Department Curriculum Chair comment:
Date: 08-OCT-2019

Department approver: Steve Carr

Chair comment:
Date: 08-OCT-2019
CS 3550: Network Fundamentals
Master Syllabus

**Network Fundamentals (1 week)**
Types of Networks
Physical and Logical Topologies
Network Design

**Network Addressing and Internet Protocol (2 weeks)**
Network Protocol Stacks (OSI, TCP/IP)
Internet Protocol (IP)
Media Access Control (MAC) and Address Resolution Protocol (ARP)
Domain Name Service (DNS)

**TCP and UDP (2 weeks)**
Differences
Common Uses
Introduction to Header Information

**Network Applications (3 weeks)**
Definition of Network Application
Common Models
Secure Design of Network Applications
Coding Network Applications

**Reading Packet Headers (2 weeks)**
Decoding IP, TCP, and UDP Headers

**Network Mapping and Scanning (2 weeks)**
Internet Control Message Protocol (ICMP)
Sniffers, Port Scanners

**Common Vulnerabilities, Attacks, and Mitigations (2 weeks)**
NIDS/NIPS and Firewalls
Wireless and Mobile Vulnerabilities
Introduction to Cryptography
Software Security
Web Security
Public Key Infrastructure (PKI)

**Course Prerequisites**

CS 1120
Catalog Description

This course examines the fundamentals of network communication. The course covers network addressing, protocols, and basic attacks against an organization's network infrastructure as well as their mitigations. Students will learn to implement network applications and capture and analyze network traffic to monitor for potential attacks. Practical exercises and labs will be used during this course to allow the students to apply these concepts in real-world scenarios.

Learning Outcomes

Students will be able to:
- Explain the fundamentals of network communication
- Explain network addressing (IPv4 and IPv6)
- Implement simple network applications
- Explain the usage and vulnerabilities of common network protocols
- Apply the concepts and fundamental principles of network security
- Explain the tools used in network reconnaissance
- Decode network packets to identify the protocols used and potential attacks