Purpose To train entry-level network support technicians and more advanced network administrators in specific computer networking skills and general troubleshooting of hardware and software related problems.

Learning Outcomes The graduate will:
- install and configure workstations, servers and networked printers.
- install and configure internetworking devices such as switches and routers.
- install and configure a variety of network operating systems and provide for interoperability between them.
- administer an organization's computer network infrastructure.
- demonstrate an understanding of network security issues and tools.
- demonstrate an understanding of the basic features of wireless networking.
- develop skills for doing network performance monitoring
- interpret the concepts of a computer network related problem-solving task.
- use appropriate library and information resources to research network management issues and tools and support lifelong technical learning.

Job Openings Projected through 2022
Lane County openings - 45 annually
Statewide openings - 462 annually

Wages
Lane County average hourly - $26.13; average annual - $54,350
Oregon average hourly - $27.97; average annual - $58,185

Costs (Estimate based on 2014-15 tuition and fees. Consult Lane’s website for updated tuition.)
Resident Tuition and Student Fees .............................. $10,982
Books and Materials.................................................. $1,831
CIT Lab Fees........................................................... $208

Total Estimate $13,021

Computer Network Operations course fees and other course fees may change during the year - see the online credit class schedule for fees assigned to courses.

Second Year Requirements A personal laptop is recommended for second-year students in the degree program. Please contact the Program Lead for options and system requirements.

Prerequisites Students must qualify for WR 121 or WR 121_H and MTH 082, either by placement testing or completing prerequisite courses. Each student should consult with a counselor or advisor to plan a program of study.

Computer Network Security The curriculum for the Computer Network Operations degree and the Computer Network Security Certificate may be taken during the same two-year period to qualify for both completion documents. This is accomplished by taking the certificate’s security courses as the degree’s second-year electives. See the following Computer Network Security Certificate of Completion description or contact the certificate coordinator Joseph Colton, 541.463.5734, coltonj@lanecc.edu

Cooperative Education (Co-op) Co-op is a required and important part of the Computer Network Operations program. It provides relevant field experience that integrates theory and practice while providing opportunities to develop skills, explore career options, and network with professionals and employers in the computer network field. Contact Gerry Meenaghan, Cooperative Education Coordinator, Bldg. 19, Rm. 231A, 541.463.5883.

Program Lead Joseph Colton, Bldg. 19, Room 144, 541.463.5249, coltonj@lanecc.edu

Note Students completing the curriculum for the Computer Network Operations degree also qualify for the Computer Network Monitoring and Management certificate. In addition, students taking CS 188 Wireless Networking, CS 285 Operating System Hardening, and CS 286 Firewalls and VPNs as their second-year electives would qualify for the Computer Network Security certificate.

Course Requirements
1. Prerequisites are required for some courses. See course descriptions.

2. All courses must be completed for a letter grade of C-, except for the Communications, Writing, Math, PE/Health, and Human Relations requirements and CS 206 which may be completed with a “Pass” grade.

3. CS/CIS/GIS Electives must be completed with a letter grade.

4. The Computer Network Operations degree contains three second-year CS/CIS/GIS electives. Students may want to consider using CS/CIS/GIS electives to take a sequence of courses from the Network Security certificate curriculum, or from one of the other degree or certificate programs, such as, Computer Programming, Computer Simulation and Game Development, Geographic Information Systems, Computer Information Systems – Health Informatics or Computer Science transfer. For more information about electives, students should contact the program lead to help determine what elective courses best fit their goals.

5. List of approved communication electives:
   - COMM 100 Basic Communication
   - COMM 111 Fundamentals of Public Speaking
   - COMM 112 Persuasive Speech
   - COMM 130 Business and Professional Speech
   - COMM 219 Small Group Discussion
   - COMM 220 Communications, Gender, and Culture

6. Students planning to pursue a bachelor’s degree in Computer Science are advised to also complete the following courses in mathematics: MTH 111 College Algebra and MTH 231, 232, 260 Discrete Mathematics 1, 2, 3.

7. Instead of CS 133P and CS 233P the student may take any two required programming courses that are a sequence from one of the other CIT degree programs.
# Two-Year Associate of Applied Science Degree

## First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 100 Computing Careers Exploration</td>
<td>2</td>
</tr>
<tr>
<td>CS 179 Introduction to Computer Networks</td>
<td>4</td>
</tr>
<tr>
<td>CIS 140W Intro to Operating Systems: Windows</td>
<td>4</td>
</tr>
<tr>
<td>MTH 082 Math for Network Operations</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

### Fall
- CIS 206 Co-op Ed: Computer Information Technology Seminar: 2
- PE/Health Requirement: 3
- CS 125D Software Tools 1: Databases: 4
- CS 279 Essentials of Network Administration: 4
- ET 287 Microcomputer Hardware: 4
- **Total Credits**: 17

### Winter
- CS 125D Software Tools 2: Databases: 4
- CS 240W Advanced Windows: Server Management: 4
- Human relations requirement: 3-4
- CG 203 Human Relations at Work recommended: 4
- Choice of: WR 121 Introduction to Academic Writing: 4
- **Total Credits**: 15-16

### Spring
- CS 233P Intermediate Programming: Python: 4
- CS 240U Advanced Unix/Linux: Server Management: 4
- CG 203 Human Relations at Work recommended: 4
- WR 121 Introduction to Academic Writing: 4
- **Total Credits**: 16

## Second Year

### Fall
- CS 289 Cisco Router and Switch Administration: 4
- Choice of: CS 225 Computer End-User Support: 4
- CS 245 Project Management: 4
- CS 240U Advanced Unix/Linux: Server Management: 4
- CS/CIS/GIS Elective: 4
- **Total Credits**: 16

### Winter
- CS 280CN Coop Ed: Computer Network Operations: 3
- CS 288 Network Monitoring and Management: 4
- WR 227 Technical Writing: 4
- CS/CIS/GIS Elective: 4
- **Total Credits**: 15

## Spring
- CS 240U Advanced Unix/Linux Server Management: 4
- CS 289 Cisco Router and Switch Administration: 4
- CS 240W Advanced Windows: Server Management: 4
- CS 288 Network Monitoring and Management: 4
- **Total Credits**: 16

## Computer Network Monitoring and Management

### Career Pathway Certificate of Completion

**Purpose**
Prepare graduates to manage and monitor modern network operating systems and the services provided by current, industry-standard platforms, including troubleshooting and proactive management for growth.

**Learning Outcomes**
The certificate recipient will:

- understand the performance fundamentals required to keep computer networks efficient
- install and configure Windows and Linux servers and Cisco routers and switches
- identify sources of network performance problems and resolve them
- implement the SNMP protocol on various networked devices
- understand the importance of proactive management and planning for growth
- install and configure an enterprise network monitoring package to track performance and availability of services
- learn how to implement event handlers and notification/alert systems
- learn to use protocol analysis software to monitor traffic and solve network problems

**Prerequisites**
The courses in this Certificate of Completion are designed to be taken with the Computer Network Operations Associate of Applied Science degree program offered by the CIT department. There are specific prerequisites for each of the four courses required for this certificate. Each of the prerequisites is a requirement in the Network Operations degree. For details see the course description of each of the four required courses. Prerequisites can be waived for current IT network technicians with the appropriate background.

**Certificate Lead** Joseph Colton, Bldg. 19, Room 144, 541.463.5249, coltonj@lanecc.edu

**Course Requirements**
All courses must be completed with a letter grade of “C-” or better.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 240U Advanced Unix/Linux Server Management</td>
<td>4</td>
</tr>
<tr>
<td>CS 289 Cisco Router and Switch Administration</td>
<td>4</td>
</tr>
<tr>
<td>CS 240W Advanced Windows: Server Management</td>
<td>4</td>
</tr>
<tr>
<td>CS 288 Network Monitoring and Management</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>
Computer Network Security

Career Pathway Certificate of Completion

Purpose To train those who already have networking skills to secure workstations, servers, and other networking devices.

Learning Outcomes The certificate recipient will:
• understand the security fundamentals required to help safeguard computer networks.
• implement wireless network security protections.
• identify and counteract attacks on workstations, servers, and other networking devices.
• identify vulnerabilities, discuss their resolutions, and generate vulnerability reports.
• install and utilize various security industry accepted tools.
• install and configure firewalls and VPNs.
• troubleshoot security issues and implement and test resolutions.

Prerequisites The courses in this Certificate of Completion are designed to be taken with the Computer Network Operations Associate of Applied Science degree program offered by the CIT department. There are specific prerequisites for each of the four courses required for this certificate. Each of the prerequisites is a requirement in the Network Operations degree. For details see the course description of each of the four required courses. Prerequisites can be waived for current IT network technicians with the appropriate background.

Certificate Lead Joseph Colton, Bldg. 19, Room 147, 541.463.5249, coltonj@lanecc.edu

Course Requirements All courses must be completed with a letter grade of “C-” or better.

Courses required Credits
CS 188 Wireless Networking ............................................. 4
CS 284 Network Security Fundamentals ................................ 4
CS 285 Operating System Hardening .................................. 4
CS 286 Firewalls and VPNs .................................................. 4

Total Credits 16

Computer Network Operations
an equal opportunity/affirmative action institution committed to cultural diversity and compliance with the Americans with Disabilities Act— 7/15

Academic Advising Online
Free online resources are available for ALL majors! On lanecc.edu, choose the Moodle button. Select Academic Advising, find your specific major, and follow the instructions to Login or select Login as a Guest.