



Michigan Technological University

Development of System Administration & Network Security Curriculum

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MichiganTech *Create Your Future!*

School of Technology

Computer Network
& System Administration

Computer Network & System Administration Program

- The CNSA Program was first introduced in 2002 at Michigan Technological University's School of Technology.
- Michigan Tech University is recognized nationally for its engineering programs.
- CNSA is a four-year bachelor degree program.
- CNSA offers students education and training in the areas of **systems administration** and **network engineering**, with an emphasis on **network security**.
- Currently about 170 students enrolled in CNSA program.

Program Notables

- A program with **the largest percent growth in students** over the past few years in Michigan Tech University.
- New lab construction to emulate industry demands
- Building industry relationships with organizations such as:
 - Cisco
 - Juniper
 - Microsoft
 - HP
 - Dell
 - Charter Communication
- Working with local industry on computer/network related projects:
 - BHK
 - GS Engineering
 - CCISD
 - Pathway Health

An article in Network World

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Identity Management

Michigan Tech students get to learn about single sign-on

By Dave Kearns, Network World, 03/08/06

 Today, I want to take you on a virtual visit to Michigan Tech University. It hasn't been a great year, sportswise, for the Huskies. While the hockey team hasn't had a winning season in 13 years, and hasn't gotten to the NCAA championships for 25, its current 7-21-6 record won't get anybody's hopes up. Still, there is one bright spot on the MTU horizon, and (you were wondering if I'd get to identity, weren't you?) it's all about real-world identity management.

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Too often, college classrooms are places to learn about old, outdated technologies. Computers, networks, software - they're all changing way too fast to be captured by some university's text books. That makes it even more interesting, and heartening, that MTU's program for the Bachelor of Science

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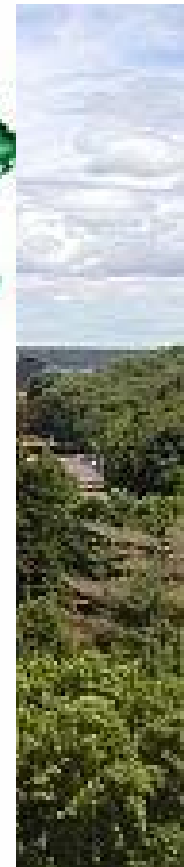
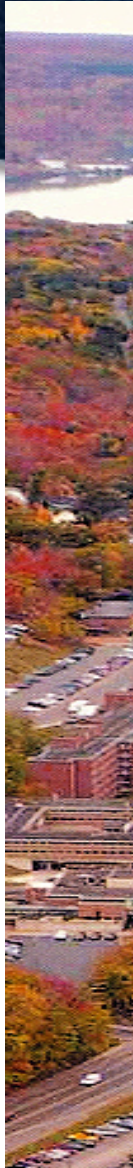
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MichiganTech

Michigan Technological University

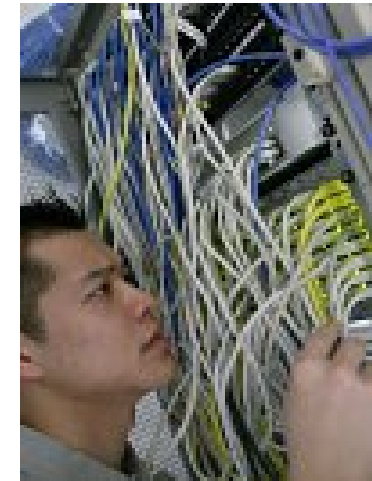


What is the Difference Between CNSA and other Computer-Related Programs?

The CNSA Program offers a “**hands-on**” approach curriculum that grants graduates of this program the education and experience to become a vital asset within an organization from day one.

Many other computer-related programs offer a more theoretical approach.

- Computer science (CS)
- Computer engineering (CE)
- Management information systems (MIS)
- Information systems (IS)



What is the Difference Between CNSA and other Computer-Related Programs?

- **Some universities and colleges offer similar programs**
 - The University of Toledo at Ohio, Computer Network Administration Program, Associate degree
- **Many offers network administration certification programs**
 - Illinois Valley Community College
- **CNSA at Michigan Tech**
 - Bachelor degree program
 - Strategically designed Curriculum
 - Innovative Courses and Labs
 - Teaching philosophy

MTU CNSA Core Course Areas:

- **Network Administration I, II and III**
 - Basic networking, TCP/IP, routing protocols, VLAN, BGP, MPLS, VPN, Cisco/Juniper router, traffic engineering ...
 - **Many CS graduates can not answer simple questions like**
 - What are the differences between router and switch?
- **Unix/Linux System Administration I and II**
 - Basic admin, installation, maintenance, networking, kernel, shell, NIS, Samba, NFS ...
- **Microsoft System Administration I and II**
 - Active Directory, group policy, maintenance, networking ...
- **Network Security I and II**
 - best practices, intrusion detection and defense, firewalls, security protocols, and many more ...

MTU CNSA Core Course Areas:

Computer-Cyber Ethics

Computer & OS Architecture

Scripting Programming Languages

Database Administration

Wireless Network and Mobile Computing

Web Server Administration

Storage Area Networks

LDAP Directory Services

Other CNSA Courses

**Calculus,
Statistics,
Linear algebra,
Cryptography,
Physics,
Electronics,
Business management,
Liberal art,
Senior project**

CNSA Plan of Study

Year 1 - Semester 1

SAT1610	Computer & OS Architecture	Credits:	3
EET1411	Basic Electronics	Credits:	4
MAT1160	Calculus 1 with Technology	Credits:	4
UN1001	Perspectives on Inquiry	Credits:	3
			<hr/>
Total:			14

Year 1 - Semester 2

EET2411	Digital Electronics	Credits:	2
EET2412	Data Communications	Credits:	2
BA2100	Statistics	Credits:	3
SAT1700	Computer-Cyber Ethics/Policy	Credits:	3
UN1002	World Cultures	Credits:	4
Gen Ed	Distribution	Credits:	3
			<hr/>
Total:			17

CNSA Plan of Study

Year 2 - Semester 1

BA2700	Business Problem Solving	Credits:	3
SAT2343	Network Administration I	Credits:	4
SAT2711	Unix & Linux Administration I	Credits:	4
SAT2400	Scripting Programming	Credits:	3
UN2001	Revisions: Oral, Written, and Visual Communication	Credits:	3
		<hr/>	
		Total:	17

Year 2 - Semester 2

BA3210	Business Database Management	Credits:	3
MA2320	Linear Algebra	Credits:	2
SAT2600	Wireless & Mobile Computing	Credits:	3
PH1100	Physics by Inquiry I	Credits:	1
SAT2511	MS System Management I	Credits:	4
UN2002	Institutions	Credits:	3
		<hr/>	
		Total:	16

CNSA Plan of Study

Year 3 - Semester 1

BA3620 Project Management	Credits:	3
SAT3511 MS System Management II	Credits:	3
HU3120 Scientific & Technical Communication	Credits:	3
PH1110 College Physics I	Credits:	3
Free Elective	Credits:	3
	<hr/>	
	Total:	15

Year 3 - Semester 2

SAT3343 Network Administration II	Credits:	4
Gen Ed Distribution	Credits:	3
SAT3812 Network Security Engineering I	Credits:	3
SAT3711 Unix & Linux Administration II	Credits:	3
MA3203 Cryptography (Security Emphasis Course) or	Credits:	3
BA2300 Principles of Accounting I	Credits:	3
(Management Emphasis Course)	<hr/>	
	Total:	16

CNSA Plan of Study

Year 4 - Semester 1

SAT4343 Network Engineering	Credit	3
SAT4200 Storage Area Networks	Credits:	3
SAT4480 Senior Project I	Credits:	3
SAT4541 Directory Services/Architecture	Credits:	3
BA4580 Law of Technology (Security Emphasis) or	Credits:	3
BA2500 Business Law I (Management Emphasis Course)	Credits:	3
	<hr/>	
	Total:	15

Year 4 - Semester 2

Gen Ed Distribution	Credits:	3
SAT4600 Web/Server Administration	Credits:	3
Free Elective	Credit	2
SAT4880 Senior Project II	Credits:	2
SAT4999 Senior Development Seminar	Credits:	1
SAT4812 Network Security Engineering II (Security Emphasis) or	Credits:	3
BA3780 Entrepreneurship (Management Emphasis Course)	Credits:	3
	<hr/>	
	Total:	17

CNSA Courses

- **Total Credits required for Graduation = 127**
- **Most CNSA core courses offer an associated lab.**
 - solidify concepts from lectures
 - gain “hands-on” experience
 - practice within an environment that replicates industry
 - students’ favorite
 - A class of 24 students are divided into two lab groups
 - For a 3-credit course:
 - 2 hour lecture,
 - (2 + 2) hour lab every week.

Mission

- **MISSION:** *We prepare students to create the future*
- **Fill the gap between the needs of society and the preparation of undergraduate students.**
 - Combine real-world experience with academic requirement
 - Teacher as creator of fertile student-centered learning environments.
- **Teach students what to learn as well as how to learn**
 - Team work
 - Self-learning ability
 - Problem solving ability
 - Knowledge vs. ability

CNSA Lab Facilities



- **Dell workstations and Sun Solaris workstations**
- **Cisco / Juniper routers and switches**
- **Sun storage network**

Valuable Industry Certifications that are Associated with CNSA Courses

- **CCNP**
- **CCNA**
- **MCSE**
- **Linux+**
- **MCP**
- **SCP**
- **RHCE**
- **A+**
- **Network+**
- **Others**

Most faculty have industry certifications.

We encourage our students to be certified.

But we won't make CNSA a certificate program.

CNSA Co-ops and Internships



**Harley-Davidson
Charter Communication**

...

Roles for CNSA Graduates

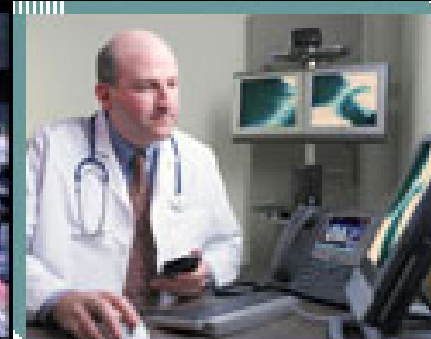
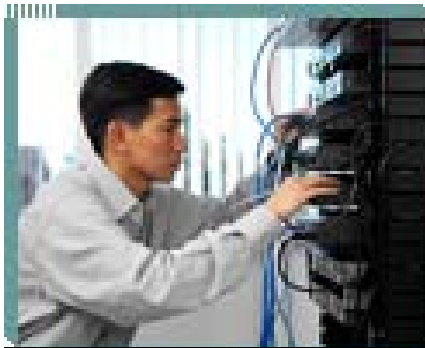
Roles for CNSA Graduates Include:

- **Network Design and Implementation**
- **Systems Administration and Development**
- **Security Design and Maintenance**
- **Database Management**
- **Server Development and Maintenance**
- **Trouble-Shooting / Technical Support**

CNSA graduates can choose from a broad list of Career Opportunities

FOR EXAMPLE:

- **Network Security Specialist**
- **Web Developer**



- **Network Engineer**
- **Health-Care Systems Admin.**

Benefits of the MTU CNSA Program

- **We offer a well-structured program designed to prepare students for a professional career in the computer network systems administration field.**
- **The CNSA program will continue to evolve to meet the changing technologies in industry.**
- **Michigan Tech University and the School of Technology are well-respected among industry and have much to offer to students.**
- **Graduating students will be well-rounded and equipped with “hands-on” knowledge, in addition to the theoretical education.**

Faculty Development and Research

- **Consulting**
- **Continuing Education**
- **Research**
- **Funding & Grants**

Equipment Donation

- **PC workstation**
- **Laptop**
- **Wireless equipment**
- **High-end server**
- **Firewall and VPN**
- **Palm, hand-held device**
- **Router and switch**
- **Blade server**
- **Storage network**

Additional Contact Information on MTU's CNSA Program

- **Web Address:** <http://www.tech.mtu.edu/cnsa>
- **Program Coordinator:** **Guy C. Hembroff**
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Questions & Answers