The University Senate of Michigan Technological University
Proposal 06-26

Establishing New Concentrations Within the B.S. in Information Technology

Basic Program Information

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Program/Degree Type: Concentrations
Program Title: Concentration in Network Administration or Applied Artificial Intelligence, within the Bachelor of Science in Information Technology
Planned Implementation Date: Fall 2026
Program location/modality: Face to Face
Target student population: new and existing student population

General description and characteristics of program

This proposal seeks to establish two new concentrations for the Bachelor of Science (BS) in Information Technology (IT) degree program which is offered by the Department of Applied Computing. The two new concentrations proposed are:
- Network Administration
- Applied Artificial Intelligence

The option of the BS in Information Technology with no concentrations remains an option. Hence, three degree audits will be developed.

The BS in IT program was originally established in 2003 under the name Computer Network and System Administration (CNSA) and was renamed Information Technology in 2024 to enhance marketing and strengthen program branding. The IT program has witnessed moderate enrollment growth since its renaming. This proposal builds on continuous efforts to further enhance enrollment and align the program with evolving industry demands.

Artificial Intelligence (AI) is widely recognized as a rapidly expanding field and employers are seeking talent across the full spectrum of AI competencies. While there is a strong need for individuals with theoretical AI foundations and skills in AI system design and development, there is an even greater need for professionals who can effectively apply AI tools and technologies across a wide range of practical contexts. These roles focus on leveraging AI to support

automation, enhance data-driven decision-making, improve system management, and optimize business operations.

While several universities in Michigan, including Michigan Tech, have introduced or are in the process of introducing programs in data science or AI fields, there are currently no dedicated BS degrees or concentrations in Applied AI. This gap presents a distinct opportunity for Michigan Tech to address strong student interest and meet the needs of employers.

Rationale

Program Rationale

The first proposed concentration, **Network Administration,** builds upon the **existing program curriculum structure** and **historical strength** of the BS in Information Technology. This concentration is designed to provide students with a strong foundation in the design, implementation, management, and administration of modern computer network infrastructures. It emphasizes both the theoretical principles and practical skills required to maintain secure, efficient, and scalable network systems that support organizational operations.

The second proposed concentration, **Applied Artificial Intelligence**, represents **a new and expanding area of growth**, focusing on the integration of AI technologies into IT and related application domains. This concentration is designed to leverage AI to enable automation, strengthen data-driven decision-making, enhance system management, and optimize IT operations. Students will gain exposure to key AI techniques such as machine learning and data analytics, while also learning how to deploy and manage AI-driven solutions within diverse organizational and industry contexts.

Under the proposed plan, all incoming students in the BS in Information Technology program will have the opportunity to select one of these two available concentrations, or **no concentration**.

The current IT program possesses several competitive advantages in offering these concentrations, including a hands-on curriculum, excellent teaching quality, committed faculty members, strong industry connections, and loyal alumni support. Our goal is to further strengthen the IT program in applied AI and computer networking while maintaining its existing strengths and providing flexibility for our students.

The College of Computing is also proposing a BS in Artificial Intelligence degree, designed to emphasize AI theoretical foundations and AI system development. In contrast, the Applied AI concentration within the BS IT degree is structured to develop practical, hands-on skills in applying AI tools and technologies to real-world IT problems. The College will make every effort to maximize shared coursework, meanwhile, the overall curriculum frameworks of the two programs remain clearly distinct. For example, the BS in AI degree includes a number of courses in programming, software development, and AI theory, while the Applied AI concentration focuses primarily on the practical application of AI tools and technologies to address real-world problems.

Job market trend

The demand for AI skills in the labor market has been rising sharply over the past few years,

making an Applied AI concentration well aligned with employer needs. In 2024, over 600,000 job postings in the U.S. required at least one AI-related skill[1]. Meanwhile, broader labor-market projections by the U.S. Bureau of Labor Statistics (BLS) anticipate that computing occupations may grow by 17.9 % between 2023 and 2033, driven in part by AI applications[2]. These trends suggest that graduates who combine foundational computing skills with the ability to apply AI tools will be competitive in many growing technical fields.

Compensation and role diversity further support the appeal of an Applied AI concentration. In the first quarter of 2025, AI-related roles in the U.S. commanded a median annual salary of over US $156,000, representing continued growth in pay and strategic importance[3].

In summary, graduates of an Applied AI concentration are well positioned to thrive in a rapidly expanding job market. Their ability to combine up-to-date technical expertise with strong domain knowledge will enable them to excel across a wide range of industries and roles.

Related programs: within MTU and at other institutions

Related Programs within MTU:
The closest related programs are the following:
- BS in Artificial Intelligence (proposed)
- BS in Data Science
- BS in Computer Science
- BS in Software Engineering
- BS in Cybersecurity
- BS in Management Information Systems

Related Programs in the Region:
Several other institutions have recently developed (or are developing programs) related to AI. Among the Michigan Association of State Universities (MASU), there are Artificial Intelligence programs at:
- Oakland University - BS / MS in Artificial Intelligence
  https://oakland.edu/secs/undergraduate-programs/artificial-intelligence/
  https://oakland.edu/secs/masters-of-science-programs/artificial-intelligence/
- University of Michigan - Flint - BS / MS in Artificial Intelligence
  https://www.umflint.edu/cit/undergrad/
  https://www.umflint.edu/graduateprograms/artificial-intelligence-ms/
- Grand Valley State University - BS / MS in Artificial Intelligence
  https://www.gvsu.edu/computing/artificial-intelligence-bs-85
  https://www.gvsu.edu/computing/artificial-intelligence-ms-106
- Ferris State University - BS in Artificial Intelligence
  https://catalog.ferris.edu/preview_program.php?catoid=3&poid=1475&returnto=237

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[1] Federal Reserve Bank of Atlanta
[2] Bureau of Labor Statistics
[3] Veritone: AI Jobs on the Rise: Q1 2025 Labor Market Analysis

Additionally, a majority of MASU institutions have related programs in Data Science, Data Analytics, and/or Business Analytics.

National Programs

There has been growth in the number of MS and now BS degree programs in Applied AI or AI nationwide. Several examples include:

- University of Tennessee, Knoxville – BS in Applied Artificial Intelligence
  https://cecs.utk.edu/academics/undergraduate-programs/applied-artificial-intelligence-program
- Miami Dade College - BS in Applied Artificial Intelligence
  https://www.mdc.edu/aicenter/programs/
- Purdue University - BS in Artificial Intelligence
  https://admissions.purdue.edu/majors/artificial-intelligence-science/
- University of Pennsylvania - BSE in Artificial Intelligence
  https://ugradadm.seas.upenn.edu/majors-program-options/bachelor-of-science-in-engineering-bse/artificial-intelligence/
- Illinois Institute of Technology - BS in Artificial Intelligence
  https://www.iit.edu/academics/programs/artificial-intelligence-bs
- Carnegie Mellon University - BS in Artificial Intelligence
  https://www.cs.cmu.edu/bs-in-artificial-intelligence/

Projected Enrollment

The following table is the enrollment projection based on prior experience from other computing degree programs.

New Enrollment in Year 1	New Enrollment in Year 2	New Enrollment in Year 3	Total New Enrollment in three years
20	30	40	90

Specialized Accreditation Requirements

The former CNSA program successfully completed its ABET site visit in Fall 2023 with no shortcomings. We anticipate that the IT program will be reaccredited by the ABET Computing Accreditation Commission (CAC) under the Information Technology program criteria in 2027. All necessary steps will be taken to ensure successful accreditation, including the submission of an interim report or coordination of a follow-up site visit as required.

Professional Licensure Requirements

Not applicable.

Assessment Plan

An assessment plan for ABET and the university will be developed, following the model established for other computing BS degrees in the College of Computing. The majority of

assessment activities will be conducted through core courses offered in applied computing and computer science.

Curriculum Details

Learning Goals

We plan to adopt the standard ABET IT Student Outcomes as the program learning goals.

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

3. Communicate effectively in a variety of professional contexts.

4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

6. Use established approaches to apply, integrate, and administer secure computing technologies to accomplish user goals.

Curriculum Design

The following courses would be part of the curriculum design. New courses are in red.
The minimum credits required for the degree: 120

Required Courses: (51-52 credits)
SAT 1000 – Introduction to Applied Computing (1)
SAT 1610 – Computer and Operating System Architecture (3)
SAT 1700 – Cyber Ethics (3)
SAT 2343 – Network Fundamentals (3)
SAT 2511 – Windows System Administration (3)
SAT 2711 – Linux System Administration (3)
SAT 3210 – Database Management (3)
SAT 3310 – Scripting for Administration, Automation, and Security (3)
SAT 3611 – Infrastructure Service Administration and Security (3)
SAT 3812 – Cybersecurity I (3)
SAT 4411 – Data Center Operations (3)
SAT 4816 – Digital Forensics (3)
(CS 1121 and CS 1122) or CS1131 – Introduction to Programming (5-6)
EET 1411 – Basic Electronics (3)
EET 2411 – Digital Electronics (3)
OSM 4300 – Project Management (3) OR MIS 3200 Systems Analysis and Design (3)
Choose one for 3 credits: HU2830, HU2840,HU3105, HU3120, HU3694, HU3845, HU4625, SS3535, SS4550 (3)

Concentration Courses

Network Administration Concentration (18 credits)
SAT 3343 – Network Administration II: Net Operations (3)
SAT 4343 – Network Administration III: Large Scale Design (3)
SAT 4344 – Network Administration IV: Advanced Networks and Optimizations (3 **(new AC course)**
SAT 3820 – Wireless System Administration and Security (3)
CS/EE 4723 – Network Security (3)
EET 3373 - Intro to Programmable Controllers (3)

Applied AI Concentration (18 credits)
DATA 1200 – Data Science with Python (3)
DATA 2201 – Foundations of Data Science (3)
CS 2800 – Intro to AI Applications (3) **(new CS course)**
SAT 3903 – AI Tools and Applications (3) **(new AC course)**
EET 4501 – Applied Machine Learning (3)
MIS 4000 - AI and Emerging Technologies for Business (3)

Under the **No Concentration** option, the 18 credits for the concentrations are moved to technical electives, and all the courses listed above for the two concentrations are added to the

list of technical electives. This gives students added flexibility under the No Concentration option.

Math and Science Requirements (11-12 credits)
MA 1160 – Calculus with Technology I (4) or MA 1161 – Calculus Plus with Technology I (5)
MA 2320 – Elementary Linear Algebra (2)
MA 2720 – Statistical Methods (4)
SAT 3830 – Discrete Structures for Computing (1)

Capstone Design (6 credits)
Option 1 (Senior Design)
    SAT 4480 - Senior Project I (3)
    SAT 4880 - Senior Project II (3)
Option 2 (Enterprise/Co-op - choose any of the following for 6 credits total)
    ENT 3950 - Enterprise Project Work III (1)
    ENT 3960 - Enterprise Project Work IV (1)
    ENT 4950 - Enterprise Project Work V Capstone (2)
    ENT 4960 - Enterprise Project Work VI Capstone (2)
    UN 3002 - Undergraduate Cooperative Education I (1-2)
    UN 3003 - Undergraduate Cooperative Education II (1-2)

Technical Electives
Concentration Option (6 credits)
    Any of SAT3000-4000, CS3000-4000, EET3000-4000, EE3000-4000
No Concentration Option (24 credits)
    Any of SAT3000-4000, CS3000-4000, EET3000-4000, EE3000-4000
    plus any of the courses included in the two concentrations above

Essential Education
(37 credit requirement: 16 credits met through major, 21 credits not met through major)
    Michigan Tech Seminar (1 cr): **met through SAT 1000**
    Composition
    Foundations of the Human World (3 cr): **met through SAT 1700**
    Math (3 cr): **met through Math and Science list**
    Natural and Physical Science
    STEM: **met through SAT 1610**
    <u>Distribution Pathway</u>
        Communications Intensive: **met through HU2830, HU2840,HU3105, HU3120, HU3694, HU3845, HU4625, SS3535, SS4550**
        Arts and Culture
        Intercultural Competency
        SHAPE elective
        STEM (3 cr): **met through SAT 2711**
        Essential Education Experience
    Activities for Well-Being and Success (3 courses /3 cr total)

Credit Totals
With a Concentration
    Major requirements excluding technical electives: 86
    Technical electives: 6
    Essential Education not fulfilled by major: 21
    Free electives: 7
    Total credits: 120
No Concentration
    Major requirements excluding technical electives: 68
    Technical electives: 24
    Essential Education not fulfilled by major: 21
    Free electives: 7
    Total credits: 120

Model Schedule for BS in Information Technology, Network Administration Concentration

Year	Fall	Spring
1	SAT 1000 – Introduction to Applied Computing (1) CS 1121 – Introduction to Programming I (3) SAT 1700 – Cyber Ethics (3) MA 1160 or 1161 – Calculus 1 (4 or 5) Essential Ed (3) **14+ credits**	CS 1122 – Introduction to Programming II (3) SAT 1610 – Computer and Operating System Architecture (3) MA 2320 – Elementary Linear Algebra (2) EET 1411 – Basic Electronics (3) Essential Ed: Science (3) **14 credits**
2	SAT 2343 – Network Fundamentals (3) SAT 2711 – Linux System Administration (3) EET 2411 – Digital Electronics (3) Free Elective (3) Essential Ed (3) **15 credits**	SAT 2511 – Windows System Administration (3) SAT 3343 – Network Administration II (3) SAT 3812 – Cybersecurity I (3) MA 2720 – Statistical Methods (4) Essential Ed (3) **16 credits**
3	SAT 3210 – Database Management (3) SAT 3611 – Infrastructure Service Administration and Security (3) SAT 4343 – Network Administration III (3) 3-credit HU/SS course (3) Essential Ed (3) **15 credits**	SAT 3310 – Scripting for Administration, Automation, and Security (3) SAT 4344 – Network Administration IV (3) SAT 3820 – Wireless System Administration and Security (3) MIS3200 – Systems Analysis and Design (3) SAT 3830 – Discrete Structures for Computing (1) Essential Ed (3) **16 credits**
4	SAT 4816 – Digital Forensics (3) Senior Projects / Enterprise / Co-op (3) OSM 4300 – Project Management (3) Technical Elective (3) Free Elective (3) **15 credits**	SAT 4411 – Data Center Operations (3) CS/EE 4723 – Network Security (3) Senior Projects / Enterprise / Co-op (3) Technical Elective (3) Free Elective (3) **15 credits**

Courses with gray background are concentration courses.

Model Schedule for BS in Information Technology, Applied Artificial Intelligence Concentration

Year	Fall	Spring
1	SAT 1000 – Introduction to Applied Computing (1) CS 1121 – Introduction to Programming I (3) SAT 1700 – Cyber Ethics (3) MA 1160 or 1161 Calculus 1 (4 or 5) Essential Ed (3) **14+ credits**	CS 1122 – Introduction to Programming II (3) SAT 1610 – Computer and Operating System Architecture (3) DATA 1200 – Data Science with Python(3) EET 1411 – Basic Electronics (3) Essential Ed: Science (3) **15 credits**
2	SAT 2343 – Network Fundamentals (3) SAT 2711 – Linux System Administration (3) DATA 2201 – Foundations of Data Science (3) EET 2411 – Digital Electronics (3) Essential Ed (3) **15 credits**	SAT 2511 – Windows System Administration (3) CS 2800 – Intro to AI Applications (3) MA 2320 – Elementary Linear Algebra (2) MA 2720 – Statistical Methods (4) Essential Ed (3) **15 credits**
3	SAT 3210 – Database Management (3) SAT 3611 – Infrastructure Service Administration and Security (3) SAT 3812 – Cybersecurity I (3) 3-credit HU/SS course (3) Essential Ed (3) **15 credits**	SAT 3310 – Scripting for Administration, Automation, and Security (3) EET 4501 – Applied Machine Learning (3) SAT 3903 – AI Tools and Applications (3) SAT 3830 – Discrete Structures for Computing (1) Free Elective (3) Essential Ed (3) **16 credits**
4	SAT 4816 – Digital Forensics (3) Senior Projects / Enterprise / Co-op (3) MIS 4000 – AI and Emerging Technologies for Business (3) OSM 4300 – Project Management (3) Free Elective (3) **15 credits**	SAT 4411 – Data Center Operations (3) Senior Projects / Enterprise / Co-op (3) Technical Elective (3) Technical Elective (3) Free Elective (3) **15 credits**

Courses with gray background are concentration courses.

Model Schedule for BS in Information Technology, No Concentration

Year	Fall	Spring
1	SAT 1000 – Introduction to Applied Computing (1) CS 1121 – Introduction to Programming I (3) SAT 1700 – Cyber Ethics (3) MA 1160 or 1161 – Calculus 1 (4 or 5) Essential Ed (3) **14+ credits**	CS 1122 – Introduction to Programming II (3) SAT 1610 – Computer and Operating System Architecture (3) MA 2320 – Elementary Linear Algebra (2) EET 1411 – Basic Electronics (3) Essential Ed: Science (3) **14 credits**
2	SAT 2343 – Network Fundamentals (3) SAT 2711 – Linux System Administration (3) EET 2411 – Digital Electronics (3) Free Elective (3) Essential Ed (3) **15 credits**	SAT 2511 – Windows System Administration (3) SAT 3812 – Cybersecurity I (3) MA 2720 – Statistical Methods (4) Technical Elective (3) Essential Ed (3) **16 credits**
3	SAT 3210 – Database Management (3) SAT 3611 – Infrastructure Service Administration and Security (3) 3-credit HU/SS course (3) Technical Elective (3) Essential Ed (3) **15 credits**	SAT 3310 – Scripting for Administration, Automation, and Security (3) SAT 3830 – Discrete Structures for Computing (1) Technical Elective (3) Technical Elective (3) Technical Elective (3) Essential Ed (3) **16 credits**
4	SAT 4816 – Digital Forensics (3) Senior Projects / Enterprise / Co-op (3) OSM 4300 – Project Management (3) Technical Elective (3) Free Elective (3) **15 credits**	SAT 4411 – Data Center Operations (3) Senior Projects / Enterprise / Co-op (3) Technical Elective (3) Technical Elective (3) Free Elective (3) **15 credits**

New Course Descriptions

Note: SAT4344 and SAT3903 were added to the curriculum as part of the curriculum binder update process during Fall 2025. CS2800 is a Computer Science course and will not be offered during the 2026–2027 academic year. Therefore, new course addition forms for these three courses are not included in this proposal.

SAT 4344 – Network Administration IV: Advanced Networks and Optimizations (3)
This course focuses on the design, configuration, and optimization of large-scale computer networks. Topics include advanced routing and switching protocols such as BGP, SD-WAN, and MPLS; policy-based versus standard routing; and firewall configuration and management. Students will also gain hands-on experience with network automation tools and the troubleshooting of complex network systems.
Prereq: SAT4343

SAT 3903 – AI Tools and Applications(3)
This course provides a hands-on, practical introduction to a wide array of applied AI tools that are transforming various professional fields. The course moves beyond the theoretical underpinnings of AI to focus on direct, practical applications. Students will gain experience using generative AI for content creation, AI-powered data analysis, and specialized tools in cybersecurity, software development, and marketing. Through weekly labs and a comprehensive final project, students will develop a critical understanding of how to select, use, and evaluate AI tools to solve real-world problems and enhance productivity, while also considering the ethical implications of these technologies.
Prereq: None

CS 2800 – Introduction to AI Applications (3)
The course provides an introduction to students about AI and modern AI tools. The course will also introduce different machine learning models, how models are trained and used, with students able to use pre-trained models.
Prereq: (CS 1121 and CS1122) or CS 1131 or DATA 1201
Note: CS2800 is a new course proposed by CS for the BS in AI degree.

Faculty Qualifications
The current faculty members for the BS in IT program are listed below, along with links to their departmental faculty webpages.

Name	Role
Todd O. Arney	Associate Teaching Professor
Yu Cai	Professor
Tim Van Wagner	Associate Teaching Professor

| Victoria Walters | Professor of Practice |
| Ronghua Xu | Assistant Professor |

Resources Needed

Library and other learning resources needed
None. The degree program will make use of existing, sufficient resources.

Suitability of existing space, facilities, and equipment
Existing space, facilities, and equipment are suitable and sufficient for the new concentration in history.

Program Costs
No new costs; uses existing labs and resources.

There are two new AC courses (SAT4344 and SAT3903) which have been included in the Fall 2025 curriculum binder update process and have been included in the two new concentrations. These courses are part of the planned updates to the BS in Information Technology curriculum to ensure its continued relevance, regardless of the concentrations, and will be included in the list of optional courses for technical electives. The third new course (CS2800) is part of the proposed BS in AI degree and will be offered by the CS department.

To balance resources in the AC department, we plan to remove SAT 4310 Advanced Scripting and SAT 4650 Introduction to Applied Computing in Python from the BS in Information Technology curriculum. Additionally, the College of Computing has been approved to hire a new tenure-track faculty member in cybersecurity, which will further support the instructional workload.