

# The University Senate of Michigan Technological University

## Proposal 44-20

### Establishment of a New Graduate Certificate in Artificial Intelligence in Healthcare

Submitted by:  
Master of Science in Health Informatics (MSHI) Program  
Department of Applied Computing  
College of Computing

1. **Proposal Date:** March 2, 2020
2. **Proposing Contacts and Departments:** Guy Hembroff, Health Informatics Graduate Program Director, hembroff@mtu.edu
3. **Sponsor Department Approvals:** NA
4. **General Description and Characteristics of Certificate**

The department of Applied Computing's Health Informatics graduate program within the College of Computing at Michigan Tech proposes a nine credit Certificate named Artificial Intelligence in Healthcare. Careers in this area effectively use the vast volume of digital health data to improve healthcare operations, safety, and delivery. They are employed by hospitals, clinics, private practices, corporations, government units, and insurance companies.

The proposed certificate provides graduate students with the ability to optimize resources, enhance clinical quality, detect healthcare fraud, and improve patient outcomes and access to care while decreasing costs.

5. **Rationale for the Certificate**

Artificial intelligence is being increasingly applied within the field of healthcare and used by providers of care, life sciences companies and insurance payers. It is transforming healthcare by analyzing, designing, implementing, and evaluating information and communication systems that enhance individual and population health outcomes, improve patient care, and strengthen the clinician-patient relationship. Healthcare professionals can use their knowledge of patient care combined with their understanding of artificial intelligence concepts, methods, and tools to:

- Assess information and knowledge needs of health care professionals and patients;
- Characterize, evaluate, and refine clinical processes;
- Develop, implement, and refine clinical decision support systems; and

- Lead or participate in the procurement, customization, development, implementation, management, evaluation, and continuous improvement of clinical information systems such as electronic health records and order-entry systems.

The Certificate documents an individual’s completion in the specialization of artificial intelligence specific to the healthcare field for current/future employers. Additionally, the Artificial Intelligence in Healthcare Certificate is stackable with the proposed Security and Privacy in Healthcare Certificate. This provides students with an opportunity to acquire two specializations in critical and expanding areas of computing and healthcare, while working towards a MS in Health Informatics.

**6. Related Programs**

- MIT (<https://professional.mit.edu/programs/certificate-programs/professional-certificate-program-machine-learning-artificial>) includes Machine Learning for Healthcare
- Stanford (<https://online.stanford.edu/programs/artificial-intelligence-graduate-certificate>)
- Michener Institute of Education at University Health Network (UHN) ([https://michener.ca/ce\\_course/artificial-intelligence-health-care-certificate-program/](https://michener.ca/ce_course/artificial-intelligence-health-care-certificate-program/))

**7. Projected Enrollments**

It is projected that enrollment in the certificate program will primarily consist of: a) on campus students from Michigan Tech who are enrolled in the Health Informatics or Data Science graduate programs and have taken shared courses between both curriculums (e.g. SAT 5114, SAT 5141, SAT 5131); and b) online students who primarily are currently working within a clinical or information technology environment and wish to gain continuing education in the areas of artificial intelligence in healthcare to help further their careers.

Table 1: Artificial Intelligence in Healthcare Certificate Projected Enrollment

Academic Semester	On Campus Projected Enrollment	Online Projected Enrollment	Total Enrollment
Fall 2020	5 students	2 students	7 students
Fall 2021	7 students	3 students	10 students
Fall 2022	8 students	4 students	12 students
Fall 2023	10 students	6 students	16 students
Fall 2024	12 students	8 students	20 students

**8. Scheduling Plans**

The coursework will be offered during regular instructional time periods and will not require changes to scheduling of classes.

## 9. Curriculum Design

### Required Coursework – 6 credits

SAT 5114: Introduction to Artificial Intelligence in Health (3 credits) – offered in the fall

SAT 5424: Population Health Informatics (3 credits) – offered in the spring

### Elective Coursework – 3 credits

SAT 5151: Application Integration and Interoperability (3 credits) – offered in the fall

SAT 5141: Clinical Decision Support Modeling (3 credits) – offered in the spring

SAT 5990: Applied Artificial Intelligence in Health (3 credits) – offered in the spring

Students pursuing the Certificate of Artificial Intelligence in Healthcare will work with their advisors to choose the best elective course, given area of interest and prior coursework.

## 10. Course Descriptions

- SAT 5114 - Introduction to Artificial Intelligence in Health (3 credits): This course introduces students to programming in Python, clinical data, and artificial intelligence methods in health. Health artificial intelligence topics such as risk prediction, imaging, natural language processing (NLP) of clinical text, computer vision, and the integration of artificial intelligence into the clinical workflow are covered. Semester offered: Fall. Prerequisite: none.
- SAT 5424 - Population Health Informatics (3 credits): This course explores the foundations of population health informatics, including information architecture; data standards and confidentiality as they pertain to population health management. This course examines key concepts related to registries, electronic health records, epidemiological databases, bio-surveillance, health promotion, and quality reporting in population health management. Semester offered: Spring. Prerequisite: SAT 5114
- SAT 5141 - Clinical Decision Support Modeling (3 credits): Course addresses complex medical decisions, evidence-based medicine, disease management and comprehensive laboratory informatics. Topics include improving physical order entry and healthcare, using medical literature, clinical case discussions, meaningful use of medical data, enhancing patient and care-giver education, disease prevention, and public health and environmental health informatics. Semester offered: Spring. Prerequisite: SAT 5114.
- SAT 5151 - Application Integration and Interoperability (3 credits): Defines and explains the role of interoperability in the development of a functioning EHR. Analyzes predominant standardization in the healthcare field such as ASTM and HL7. Examines the challenges to the development of interoperability in healthcare. Semester offered: Fall. Prerequisite: none
- SAT 5990 - Applied Artificial Intelligence in Health (3 credits): is an overview of identifying, designing, and implementing practical applications of artificial intelligence in healthcare. This course is designed to expose the real-world interaction between healthcare and technology and not on theory. As a research and project-based course, students will have opportunities to learn and specialize in

particular artificial intelligence methods, medical applications, and relevant tools. Every effort is made to provide practical and up-to-date examples of issues and interesting emerging technologies for the students. Semester offered: Spring.  
Prerequisite: SAT 5114

### **11. Model Schedule Demonstrating Completion Time**

The Certificate is designed to be completed over a two-semester sequence.

#### **Fall Semester**

SAT 5114: Introduction to Artificial Intelligence in Health

#### **Spring Semester**

SAT 5424: Population Health Informatics

Students will complete the Certificate requirements through taking an elective course in either Fall (SAT 5151) or Spring (SAT 5141 or SAT 5990) semester.

The Certificate can be completed on-campus or online, as the MSHI has established its full curriculum online. All MSHI faculty are certified for online instruction.

### **12. Library and other Learning Resources**

No new library or other learning resources will be required by the MSHI program

### **13. Faculty Resumes**

- Dr. Yu Cai, PhD, Professor
- Dr. Guy Hembroff, PhD, Associate Professor
- Dr. Donald Peck, PhD, Professor of Practice
- Dr. Jinshan Tang, PhD, Professor
- Dr. Weihua Zhou, PhD, Assistant Professor

All Faculty Curriculum Vitae can be found at: <https://www.mtu.edu/health-informatics/people-groups/faculty/>

### **14. Equipment**

No additional equipment will be required.

### **15. Program Costs**

No additional costs are anticipated. Current faculty resources would support enrollment growth of 35 students for the Artificial Intelligence in Healthcare Certificate and 40 students for the Security and Privacy in Healthcare Certificate, totaling 75 students (at a 15:1 ratio) for the two stackable certificates. Charges for any software not provided through gratuitous educational licenses can be recovered through appropriate course lab fees.

### **16. Space**

No additional space will be required.

**17. Policies, Regulations, and Rules**

Not Applicable

**18. Accreditation Requirements**

Adding this certificate program will not result in any change to accreditation requirements. The Artificial Intelligence in Healthcare Certificate will automatically become subject to periodic review with the Health Informatics graduate program.

**19. Planned Implementation Date**

Fall 2020

**20. Assessment**

An overview of the Health Informatics Graduate Learning Objectives used for the assessment of the Artificial Intelligence in Healthcare Certificate are as follows:

- GL01 - Demonstrate proficiency of the subject matter.
- GL02 - Demonstrate knowledge of core competencies in selected, complementing areas of the subject matter.
- GL05 - Demonstrate professional skills (oral, written, and practice of responsible conduct of the profession).

Table 2: Health Informatics Graduate Learning Objectives for Certificate Assessment

<b>Assessment Points</b>	<b>Graduate Learning Objectives (GLO)</b>
Grades in certificate courses (SAT 5114, SAT 5141, SAT 5151, SAT 5424, SAT 5990)	GLO1, GLO2
Course Instructor is Responsible for completing Class Communication Evaluation.	GL05