

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Resolution

Granting Initial Approval of and Permission to Submit to the Alabama Commission on Higher Education (ACHE) of a Proposal for a Master of Science (M.S.) Degree in Artificial Intelligence in Medicine (CIP Code 11.0102)

WHEREAS, The University of Alabama at Birmingham (UAB) Marnix E. Heersink School of Medicine strives to deliver quality programs that are relevant and innovative; and

WHEREAS, the Board of Trustees approved the Notice of Intent to Submit a Proposal (NISP) during its November 3, 2023, meeting; and

WHEREAS, the intended Master of Science (M.S.) degree in Artificial Intelligence in Medicine will be designed to enable engineers, computer scientists, and future clinical practitioners to adopt an integrated approach to improving human health which leverages artificial intelligence; and

WHEREAS, this will be a unique program in the Birmingham medical community; and

WHEREAS, the program is designed to provide a comprehensive training through four key areas including foundations, applications, integrations, and design through thesis research; and

WHEREAS, the program curriculum is developed in collaboration with the Schools of Engineering, Business and Health Professions;

NOW, THEREFORE, BE IT RESOLVED by The Board of Trustees of The University of Alabama that it approves granting approval of and submission to the Alabama Commission on Higher Education (ACHE) a proposal for a Master of Science (M.S.) degree in Artificial Intelligence in Medicine (CIP Code 11.0102) by The University of Alabama at Birmingham.

RAY L. WATTS, M.D.
President

November 28, 2023

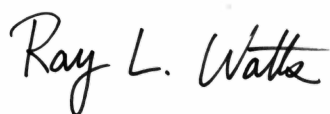
Chancellor Finis St. John, IV
The University of Alabama System
500 University Boulevard East
Tuscaloosa, AL 35401

Dear Chancellor St. John:

The Heersink School of Medicine at UAB proposes to establish a Master of Science (M.S.) degree in Artificial Intelligence in Medicine. There is a growing demand for professional education and technical expertise at the graduate level that is focused on Artificial Intelligence in Medicine. The proposed program will address this demand by offering a comprehensive and integrative curriculum to provide strong foundations of AI, a comprehensive understanding of existing applications of AI to clinical care, and the integration of artificial intelligence in health care settings.

The proposal has been thoroughly reviewed here at UAB and has my full support. If you approve, please include this item on the Board's agenda for its February 2, 2024 meeting and then forward it to the Alabama Commission on Higher Education. If additional information is needed, we will be pleased to provide it.

Sincerely,



Ray L. Watts, M.D.
President

RLW:khm

Attachments

cc: Dr. Pam Benoit
Dean Anupam Agarwal
Dr. Tonja Johnson
Mrs. Kirsten Burdick

OFFICE OF THE PRESIDENT

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November 28, 2023

MEMORANDUM

TO: Ray Watts, M.D.
President

FROM: Pam Benoit, Ph.D.
Senior Vice President for Academic Affairs and Provost

SUBJECT: Academic Affairs Items for February 2024 Board of Trustees Meeting

For the February 2, 2024, Board of Trustees meeting, we are submitting the following Academic Affairs items from the following UAB Deans:

Kecia Thomas, Dean, College of Arts and Sciences

- Music Therapy Concentration in existing Bachelor of Art in Music

Teresa Taber-Doughty, Dean School of Education

- NISP Bachelor of Science in eSports Performance Management and Coaching in Kinesiology
- Closure of Concentration in School Counseling in existing Master of Arts in Counseling
- Graduate Certificate in eSports Organization
- NISP Master of Science in Higher Education Intercollegiate Athletics Administration

Anupam Agarwal, Dean, Heersink School of Public Medicine

- Master of Science in Artificial Intelligence in Medicine

Andrew J. Butler, Dean of the School of Health Professions

- NISP Bachelor of Science Medical Imaging and Therapeutics
- NISP Nuclear Medicine Advanced Associate

These requests have my full endorsement for submission to the Board of Trustees for review and approval at their February 2, 2024, meeting. Please let me know if you have any questions.

PB/khm



Pam Benoit, Ph.D.
Senior Vice President for Academic Affairs and Provost

The University of Alabama System:

Outline for a New Proposal: MS in Artificial Intelligence in Medicine

Executive Summary

The Master of Science in Artificial Intelligence in Medicine (AIM) program is designed to provide a dynamic educational experience that equips students with the knowledge and skills required to excel in the evolving intersection of medicine and artificial intelligence (AI). The MS AIM degree is being offered collaboratively by the Marnix E. Heersink School of Medicine (HSOM) and the Marnix E. Heersink Institute of Biomedical Innovation (MHIBI). The mission of the MS in Artificial Intelligence in Medicine is to produce graduates who are prepared for the workforce with graduate-level expertise in artificial intelligence with specialized knowledge in medical applications. Such graduates will serve as critical accelerators in translation and adoption of medical AI technologies. The goal of the proposed MS in Artificial Intelligence in Medicine program is to provide graduate-level professionals with AI application skillsets from various backgrounds (biomedical engineers, computer scientists, and future clinical practitioners) to adopt an integrated approach to improving human health and patient outcomes.

The program will span across UAB by collaborating with other academic schools including departments within the College of Arts and Sciences, School of Health Professions, and the School of Engineering. The proposed MS AIM program is unique, as it specializes in the use of AI for medical and clinical applications, making it the first of its kind in the state of Alabama and the Southeastern U.S. This innovative program aims to contribute to the economic development of Birmingham as well as the state of Alabama by producing highly skilled professionals in an emerging field within one of our state's most promising industries. MS AIM combines academic rigor with real-world applications, offering students a strong foundation in AI while providing opportunities for practical experience in clinical settings. The proposed degree meets the needs of the growing population of healthcare-related technological companies in Birmingham and the state of Alabama, as well as UAB students who will join the Birmingham and Alabama healthcare workforce, including but not limited to physicians and nurses. It will also aid UAB students and faculty who plan to launch their own healthcare ventures and those in other clinically-related fields who desire specific knowledge and technical skills in advanced AI techniques.

The MS AIM program emphasizes a work-based learning approach. Students will engage in cutting-edge research at UAB, collaborate with faculty experts, and utilize state-of-the-art AI labs to gain a comprehensive understanding of AI's practical applications in medicine. By emphasizing real-world experiences, the program equips graduates with the skills needed to thrive in the evolving landscape of AI in Medicine and the broader workforce. The MS AIM program is poised to make a significant impact by addressing the growing demand for professionals with expertise in AI and its applications in medicine. By providing a unique educational opportunity and preparing graduates for practical work-based experiences, this program will contribute to the economic development of Birmingham, the state of Alabama and the Southeast while fostering advancements in medicine and patient outcomes through the power of artificial intelligence.

2. Steps taken to determine if other UA System Institutions might be interested in collaborating in the program.

We have long-standing internal collaborations established and opportunities for partnership with other University of Alabama System Institutions will be considered.

3. Desegregation Impact Statement:

The UAB Marnix E. Heersink School of Medicine and the Marnix E. Heersink Institute of Biomedical Innovation are committed to ensuring recruitment and retention of students from diverse backgrounds in all programs. We will ensure this program, like all other degree offerings at the University of Alabama at Birmingham, is accessible and available to diverse populations.

4. Summary of Consultant's Comments

N/A

5. Summary of Other Campuses' Comments

UA identified possibly opportunities for collaboration between faculty, and synergy with their graduate programs. UA also expressed interest in recruiting graduates with this degree.

6. Other pertinent information

N/A

September 18, 2023

To: Ragib Hasan, Chair, UAB Graduate Curriculum Committee

From: Rubin Pillay, Director, Marnix E. Heersink Institute for Biomedical Innovation
Cristin Gavin, Assistant Dean for Undergraduate Biomedical Programs

Re: Full Proposal, MS in Artificial Intelligence in Medicine (AIM)

Thank you for your consideration of the proposal for the MS Artificial Intelligence in Medicine to be offered by the Heersink School of Medicine. This degree was proposed to GCC earlier this year via a NISP which was approved. As a follow up to the NISP, we submit the full proposal for GCC review and consideration.

Please find the following enclosed the following documents:

1. Document that includes:
 - a. Full Proposal with course table
 - b. New Course Forms for seven new courses.
 - c. Letters of Support from:
 - Molly Wasko, Associate Dean, Collat School of Business
 - Jane Banaszak-Holl, Chair, Department of Health Services Administration, School of Health Professions
 - Alan Eberhardt, Associate Chair of Education, & Palaniappan Sethu, Program Director, School of Engineering
2. Excel file of Full Proposal Part 3.

There are two options provided to the students.

1. Course work only through electives chosen from existing courses offered across UAB (School of Engineering, Department of Computer Science, Collat School of Business, and School of Health Professions) and
2. Thesis option with intent to conduct research towards developing advanced AI models for medical data in collaboration with existing principal investigators and researchers at UAB.

There are seven new courses being proposed for addition to the graduate catalog. We included the new course forms in this document for review.

AIM 641: Technical Introductions to Deep Learning in Medicine
AIM 642: Artificial Intelligence (AI) for Medical Imaging
AIM 643: Artificial Intelligence (AI) for Biomedical Signals and Critical Systems
AIM 644: Reinforcement Learning (RL) for Clinical Decision Making
AIM 645: Advanced Natural Language Processing (NLP) in Medicine
AIM 646: Large Language Model (LLM) Development in Medicine
AIM 647: Explainable Artificial Intelligence (AI) in Medicine

In addition, we have obtained letters of support from three UAB Schools and have received approval to include existing UAB courses as electives in the new program. We are closely collaborating with others to ensure seamless integration and no duplication of existing courses and efforts. We appreciate your consideration of this proposal and look forward to discussing it with you.



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Proposal for a New Degree Program

I. Information and Rationale

A. Primary Contact Information

Institution: University of Alabama at Birmingham

Contact: Katrina Mintz

Title: Associate Vice Provost

Email: kmintz@uab.edu

Telephone: (205) 934-2753

B. Program Information

Date of Proposal Submission: 9/27/2023

Award Level: Master's Degree

Award Nomenclature (e.g., BS, MBA): MS

Field of Study/Program Title: Artificial Intelligence in Medicine (AIM)

CIP Code (6-digit): 11.0102

C. Implementation Information

Proposed Program Implementation Date: 1/1/2025

Anticipated Date of Approval from Institutional Governing Board: 2/2/2024

Anticipated Date of ACHE Meeting to Vote on Proposal: 6/14/2024

SACSCOC Sub Change Requirement (Notification, Approval, or NA): Choose an item.

Other Considerations for Timing and Approval (e.g., upcoming SACSCOC review):

D. Specific Rationale (Strengths) for the Program

List 3 – 5 strengths of the proposed program as specific rationale for recommending approval of this proposal.

1. Research by Hanover found that health science practitioners are increasingly working with Artificial Intelligence (AI) and must be prepared to have data proficiency and work with rapid advances of this technology. The global AI in healthcare market size is expected to rise to \$12.2 billion by 2030. In addition, the National Academy of Medicine proclaims that the emergence of advanced AI technologies offers unprecedented opportunities to improve patient outcomes, reduce costs, and impact population health. Healthcare professionals are now strongly recommended to learn to effectively use AI systems to make quicker and reliable diagnoses and therapeutic decisions. AI is expected to be standard in future medical practice. The proposed MS in AIM program fulfills this anticipated gap in skillset and assists healthcare professionals and facilities with comprehensively trained workforce who acquired



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advanced knowledge of the practice of artificial intelligence in medicine from vision to formulation, analysis, design, validation, and implementation.

2. UAB emphasizes economic development as an explicit institutional responsibility. The institution's current strategic plan, Forging the Future, established four mission pillars to guide the next five years of UAB's strategic operations. Two of these pillars are (1) research, innovation, and economic development and (2) patient care. UAB's strong commitment to this mission was recently recognized via an Innovation and Economic Prosperity (IEP) designation from the Association of Public Land-grant Universities (APLU). The IEP designation recognizes UAB's economic engagement with respect to (1) talent and workforce development, and (2) innovation, entrepreneurship, and technology-based economic development. The proposed MS Artificial Intelligence in Medicine (AIM) degree supports these mission-related goals by educating and graduating a talented workforce of artificial intelligence experts advancing patient care and subsequently leading to biomedical innovation ecosystem and AI technology-led economic development. It will also contribute to the transfer of UAB medical AI innovations into commercial settings and capitalize on UAB's location in Birmingham and its strength in biomedical sciences.
3. A significant proportion of job advertisements in the past six months are looking for healthcare innovators with data science and AI technology skills. Some of the most common employers are looking for advanced expertise in deep learning, computer vision, and large language modeling for healthcare data. The proposed program is designed specifically to meet this demand.
4. The UAB Heersink School of Medicine received a significant gift to launch an institute for biomedical innovation focused explicitly on capacity development to support AI education, healthcare innovation, and entrepreneurship ecosystem of Birmingham and Alabama. The gift will enable the institute to recruit world class specialized faculty to lead the academic healthcare innovation program. This gift will enable the Heersink School of Medicine to be one of a few schools of medicine to offer an AI in Medicine MS degree.
5. The overall environment is primed for coordination between UAB's Engineering, Computer Science, Business, Healthcare Innovation, and Technology, all of which transfer both across the institution and into the broader community. A strong foundation is in place for the new graduate degree program for immediate and sustained success.

List external entities (more may be added) that may have supplied letters of support attesting to the program's strengths and attach letters with the proposal at the end of this document.

1. Molly Wasko, PhD (Collat School of Business)
2. Jane Banaszak-Holl, PhD (School of Health Professions)
3. Alan Eberhardt, PhD (School of Engineering)
4. Palaniappan Sethu, PhD (School of Engineering)
5. Leon Jololian, PhD (School of Engineering)



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II. Background with Context

A. Concise Program Description

Include general opportunities for work-based and/or experiential learning, if applicable.

According to comprehensive research conducted by Market Research Future (MRFR), Artificial Intelligence (AI) in healthcare market size is expected to hit \$12.22 billion from 2022-2030. The demand for improved patient outcomes is expected to be a significant factor towards the development of AI-assisted solutions enabling accurate patient diagnoses, treatment plans, monitoring of disease trajectories. It has been cited that 'the high cost of implementing AI in healthcare, the lack of skilled professionals, and data privacy concerns are most anticipated restraints for the AI in healthcare market growth'. There is growing demand for professional education and technical expertise at the graduate level that is focused on AI in Medicine.

The proposed MS in AI in Medicine graduate degree program will address this demand by offering a comprehensive and integrative curriculum that will provide strong foundations of AI, comprehensive understanding of existing AI applications for clinical care, design, and integration of AI in health care settings. Students will be provided multiple hands-on experiential learning opportunities through project-based course work and thesis research option. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses that are offered by UAB Schools of Engineering and Department of Computer Science to explore key contextual areas to develop sub-specialized knowledge for specific AI-supported medical applications. In thesis option, students will engage with a research advisor (PI of any research lab at UAB focusing on the developing of medical AI systems) towards hypothesizing, designing, and implementing an AI project relevant to medical applications.

The proposed program specializing the use of AI for medical/clinical applications will be the first in the state and meets the needs of the growing population of healthcare-related technological companies in Birmingham and the state of Alabama, as well as UAB students who will join the Birmingham and Alabama healthcare workforce, including but not limited to physicians and nurses. It will also help UAB students and faculty who plan to launch their own healthcare ventures and those in other health-related fields who desire specific knowledge and technical skills in advanced AI techniques.

Artificial intelligence in medicine is now rapidly evolving to a new subfield where previously unrelated technical disciplines are now used to influence clinical decision making and patient outcomes. The mission of the proposed MS in Artificial Intelligence in Medicine will produce a technical workforce who has attained graduate level expertise in artificial intelligence with specialized knowledge in healthcare applications. These graduates will serve as accelerators in adoption and industrialization of healthcare AI technologies.

B. Student Learning Outcomes

List four (4) to seven (7) of the student learning outcomes of the program.

1. Apply and evaluate contemporary Artificial Intelligence (AI) processes to draw inferences from medical data and help automate the development of AI systems and components.
2. Acquire knowledge on the ethical concerns in developing and implementing responsible medical AI technologies.



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3. Acquire graduate level algorithmic expertise in one of the specialization areas: medical imaging, large language models in medicine, biomedical signals and critical care systems, and clinical decision making.
4. Create complex medical AI models from vision to formulation, analysis, design, validation, and implementation.
5. Translate and integrate state-of-the-art AI solutions in large clinical settings and high-performance computing environments.

C. Administration of the Program

Name of Dean and College: Anupam Agarwal, Marnix E. Heersink School of Medicine

Name of Department/Division: Undergraduate Medical Education

Name of Chairperson: Rubin Pillay, Director, Marnix E. Heersink Institute of Biomedical Innovation; Cristin Gavin, Assistant Dean for Undergraduate Biomedical Programs

D. Similar Programs at Other Alabama Public Institutions

List programs at other Alabama public institutions of the same degree level and the same (or similar) CIP codes. If no similar programs exist within Alabama, list similar programs offered within the 16 SREB states. If the proposed program duplicates, closely resembles, or is similar to any other offerings in the state, provide justification for any potential duplication.

CIP Code	Degree Title	Institution with Similar Program	Justification for Duplication
51.0799	MS in Health Informatics (MSHI)	UAB	The AI component to the MSHI is a non-technical pathway.

E. Relationship to Existing Programs within the Institution

1. Is the proposed program associated with any existing offerings within the institution, including options within current degree programs? Yes No

(Note: Most new programs have some relationship to existing offerings, e.g., through shared courses or resources). If yes, complete the following table. If this is a graduate program, list any existing undergraduate programs which are directly or indirectly related. If this is a doctoral program, also list related master's programs.

Related Degree Program Level	Related Degree Program Title	Explanation of the Relationship Between the Programs
Master's	Computer Science (CS)	The proposed AIM graduate program curriculum includes three (3) courses offered by Department of Computer Science as electives. CS680 (Matrix Algorithms for Data Science), CS616 (Big Data Programming), and CS675 (Data Visualization). This technical coursework will further strengthen AI algorithm development skillset for the enrolled students.



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Master's	Electrical and Computer Engineering (ECE)	The AIM graduate degree curriculum includes 2 courses from Department of ECE as electives. EE638 (Neural Time Series Data Analyses) and EE626 (Computer Vision). As majority of medical AI applications include medical images and signals as input, these elective courses provide advanced instruction on image and neural signal analyses which would be a beneficial add on to AI in Medicine graduates.
Master's	Electives from the School of Health Professions (SHP)	As part of core curriculum for MS AIM program, we will be collaborating with School of Health Professions to offer two critical courses required for any graduate trainee to understand Privacy and Security in Healthcare and Leadership and Ethics for AI in Medicine
Master's	MS in Healthcare Innovation (HCI)	The MS in HCI is offered collaboratively between the HSOM and MHIBI. The HCI courses contribute to credit hours for both the MS HCI and the MS AIM.

2. Will this program replace any existing programs or specializations, options, or concentrations? **Yes** **No**

If yes, please explain.

3. Will the program compete with any current internal offerings? **Yes** **No**

If yes, please explain.

F. Collaboration

Have collaborations with other institutions or external entities been explored? **Yes** **No**

If yes, provide a brief explanation indicating those collaboration plan(s) for the proposed program.

Students graduating with the MS in AIM from UAB could continue with a PhD at other institutions. Our objective is to produce the next generation of biomedical researchers with advanced skillsets in dealing with large medical data and develop relevant AI tools for disease diagnosis, prognosis, and management. The core curriculum has no overlap with any other programs and has been solely designed to help students to acquire medical AI experience. We have chosen a list of courses (from ECE, BME, CSE, and SHP) to further enhance the technical skillsets of the enrolled students in addition to the core curriculum.

Have any collaborations within your institution been explored? **Yes** **No**

If yes, provide a brief explanation indicating those collaboration plan(s) for the proposed program.

The integration of AI in Medicine is a multifaceted challenge that transcends traditional boundaries. MEHIBI recognizes these challenges, and the program will closely collaborate with other schools to ensure seamless integration and no duplication of existing courses and



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efforts. We have provided letters of support from each of these programs further highlighting the separation of the core curriculum from existing coursework across the campus.

G. Specialized Accreditation

1. Will this program have any external accreditation requirements in addition to the institution's SACSCOC program requirements? Yes No

If yes, list the name(s) of the specialized accrediting organization(s) and the anticipated timeframe of the application process.

2. Does your institution intend to pursue any other non-required accrediting organizations for the program?* Yes No

If yes, list the name(s) of the organization(s) and the purpose of the pursuit.

If there are plans to pursue non-required external accreditation at a later date, list the name(s) and why the institution is not pursuing them at this time.

Note: Check *No* to indicate that non-required external accreditation will not be pursued, which requires no explanation.

H. Admissions

- Will this program have any additional admissions requirements beyond the institution's standard admissions process/policies for this degree level? Yes No

If yes, describe any other special admissions or curricular requirements, including any prior education or work experience required for acceptance into the program.

1. An applicant must have a degree equivalent to a four-year U.S. baccalaureate degree in the related field of computer science, data science, statistics, artificial intelligence, biomedical engineering, electrical and computer engineering, or other engineering related fields. Similar degrees not listed will need approval by the program directors.
2. A minimum GPA of 3.0 is required as per UAB Graduate School's admission policy. Students will be expected to maintain a minimum 3.0 in coursework to remain in good academic standing.
3. Strong academic background in calculus, statistics, and linear algebra.
4. International applicants without a U.S. bachelor's, master's or doctoral degree must present scores that meet the UAB Graduate School's minimum requirements for English proficiency (IELTS score > 6.5).

I. Mode of Delivery

Provide the planned delivery format(s) (*i.e.*, in-person, online, hybrid) of the program as defined in policy along with the planned location(s) at which the program will be delivered (*i.e.*, on-campus and/or at specific off-campus instructional site(s)). Please also note whether any program requirements can be completed through competency-based assessment.

The mode of delivery for the MS AIM will be in-person, on-campus (Birmingham, AL), and hybrid. Program requirements cannot be completed via competency-based assessments.



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J. Projected Program Demand (Student Demand)

Briefly describe the primary method(s) used to determine the level of student demand for this program using evidence, such as enrollments in related coursework at the institution, or a survey of student interest conducted (indicate the survey instrument used), number and percentage of respondents, and summary of results.

The Marnix E. Heersink Institute for Biomedical Innovation (MHIBI) has actively engaged with department chairs and research-intensive faculty across UAB to solicit input and feedback. These discussions were held to gauge the need of the proposed program to ensure that the mission and goals of the program reflect the diverse perspectives and expertise spanning across the Institution. As evidenced by the letters of support accompanying this proposal, there is widespread support from collaborative departments across UAB. This further underscores the interest across various disciplines towards a specific program training a technical workforce focusing on design, implementation, and integration of artificial intelligence tools in healthcare settings.



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III. Program Resource Requirements

A. Proposed Program Faculty*

Current Faculty and Faculty to Be Hired

Complete the following **New Academic Degree Proposal Faculty Roster** to provide a brief summary and qualifications of current faculty and potential new hires specific to the program.

***Note:** Institutions must maintain and have current as well as additional faculty curriculum vitae available upon ACHE request for as long as the program is active, but CVs are **not** to be submitted with this proposal.

We will be recruiting faculty who have the requisite qualifications and experience in the respective areas outlined in the course structures for the Masters. Faculty will fall into two categories given our experiential approach.

1. Terminal degrees and Teaching Experience at the graduate level in:
 - Big data and AI, Computer Science, Informatics, Data Science
 - Electrical and Computer Engineering, Biomedical Engineering
2. Significant applied experience as an innovator of medical AI technologies (e.g., patents, product, or service development) or entrepreneurial experience (e.g., start-up, successful launch).

Current Faculty			
1	2	3	4
CURRENT FACULTY NAME (FT, PT)	COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)	ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed	OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)
Rubin Pillay (FT)		MD, PhD	
Molly Wasko (PT)	HCI 613 (3 hours, G), MBA 688 (3 hours, G), MBA 681 (3 hours, G), IS 660 (3 hours, G), MBA 619 (3 hours, G)	PhD;	IP, OL
Anthony Chang (PT)	HCI 611 (3 hours, G)	MD, PhD	IP, OL
Carlos Cardenas (PT)	HCI 614 (3 hours, G), BME 698 (3 hours, G), BME 798 (3 hours, G)	PhD	IP, OL
Sandeep Bodduluri (PT)	HCI 611 (3 hours, G), HCI 612 (3 hours, G), EE 623 (3 hours, G), EE 626 (3 hours, G)	PhD	IP, OL
Ryan Godwin (PT)	HCI 612 (3 hours, G)	PhD	IP, OL
Ryan Melvin (PT)	INFO 403 (3 hours, G), INFO 302 (3 hours, G), INFO 610/710 (3 hours, G)	PhD	IP, OL
Christy Harris Lemak (PT)	HCI 613 (3 hours, G), HA 637 (3 hours, G), HQS 630 (3 hours, G), HCM 401 (3 hours, UT), HA 680 (3 hours, G), AHD 706 (3 hours, G),	PhD	IP, OL



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Current Faculty			
1	2	3	4
CURRENT FACULTY NAME (FT, PT)	COURSES TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)	ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed	OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)
Shannon Houser (PT)	HI 620 (3 hours, G); HI 675 (3 hours, G); HI 676 (3 hours, G); HI 618 (3 hours, G); HCM 425 (3 hours, UT); HIM 418 (3 hours, UT); HIM 450 (3 hours, UT)	PhD	IP, OL
Pietro Bonizzi (PT)	Intro to Data Science & AI (3 hours, G); Signal & Image Processing (3 hours, G); Model Identification & Data Fitting (3 hours, G)	PhD	IP, OL
Additional Faculty (To Be Hired)			
1	2	3	4
FACULTY POSITION (FT, PT)	COURSES TO BE TAUGHT including Term, Course Number, Course Title, & Credit Hours (D, UN, UT, G, DU)	ACADEMIC DEGREES and COURSEWORK Relevant to Courses Taught, including Institution and Major; List Specific Graduate Coursework, if needed	OTHER QUALIFICATIONS and COMMENTS Related to Courses Taught and Modality(ies) (IP, OL, HY, OCIS)
(PT)	3-credit hours, G	PhD; Big data & AI, CS, Data Science	OL, IP
(PT)	3-credit hours, G	PhD; EE, BME	OL, IP

Abbreviations: (FT, PT): Full-Time, Part-Time; (D, UN, UT, G, DU): Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate, Dual: High School Dual Enrollment
 Course Modality: (IP, OL, HY, OCIS): In-Person, Online, Hybrid, Off-Campus Instructional Site
 Courses Taught/To be Taught – For a substantive change prospectus/application, list the courses *to be taught*, not historical teaching assignments.



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B. All Proposed Program Personnel

Provide all personnel counts for the proposed program.

Employment Status of Program Personnel		Personnel Information		
		Count from Proposed Program Department	Count from Other Departments	Subtotal of Personnel
Current	Full-Time Faculty	1		1
	Part-Time Faculty		9	9
	Administration		1	1
	Support Staff		1	1
**New To Be Hired	Full-Time Faculty			
	Part-Time Faculty		2	2
	Administration		2	2
	Support Staff		2	2
			Personnel Total	17

****Note:**

Any new funds designated for compensation costs (Faculty (FT/PT), Administration, and/or Support Staff to be Hired) **should be included** in the **New Academic Degree Program Business Plan Excel file**. Current personnel salary/benefits (Faculty (FT/PT), Administration, and/or Support Staff) **should not be included** in the **Business Plan**.

Provide justification that the institution has proposed a sufficient number of faculty (full-time and part-time) for the proposed program to ensure curriculum and program quality, integrity, and review.

C. Equipment

Will any special equipment be needed specifically for this program? Yes No
 If yes, list the special equipment. Special equipment cost should be included in the **New Academic Degree Program Business Plan Excel file**.

D. Facilities

Will any new facilities be required specifically for the program? Yes No
 If yes, list only **new** facilities. New facilities cost should be included in the **New Academic Degree Program Business Plan Excel file**.

Will any renovations to any existing infrastructure be required specifically for the program? Yes No
 If yes, list the renovations. Renovation costs should be included in the **New Academic Degree Program Business Plan Excel file**.

E. Assistantships/Fellowships



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Will the institution offer any assistantships specifically for this program? Yes No

If yes, how many assistantships will be offered?

The expenses associated with any *new* assistantships should be included in the **New Academic Degree Program Business Plan Excel file**.

F. Library

Provide a brief summarization (one to two paragraphs) describing the current status of the library collections supporting the proposed program.

The University of Alabama at Birmingham library currently has sufficient discipline-specific learning resources to support a program focused on both medicine and artificial intelligence. These resources include discipline related electronic databases which include discipline-specific refereed journals and primary source materials. No additional library or information sciences resources will be necessary to support the M.S. Artificial Intelligence in Medicine.

Will additional library resources be required to support the program? Yes No

If yes, briefly describe how any deficiencies will be remedied, and include the cost in the **New Academic Degree Program Business Plan Excel file**.

G. Accreditation Expenses

Will the proposed program require accreditation expenses? Yes No

If yes, briefly describe the estimated cost and funding source(s) and include cost in the **New Academic Degree Program Business Plan Excel file**.

H. Other Costs

Please explain any other costs to be incurred with program implementation, such as marketing or recruitment costs. Be sure to note these in the **New Academic Degree Program Business Plan Excel file**.

I. Revenues for Program Support

Will the proposed program require budget reallocation? Yes No

If yes, briefly describe how any deficiencies will be remedied and include the revenue in the **New Academic Degree Program Business Plan Excel file**.

Will the proposed program require external funding (e.g., Perkins, Foundation, Federal Grants, Sponsored Research, etc.)? Yes No

If yes, list the sources of external funding and include the revenue in the **New Academic Degree Program Business Plan Excel file**.



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Please describe how you calculated the tuition revenue that appears in the **New Academic Degree Program Business Plan Excel file**. Specifically, did you calculate using cost per credit hour or per term? Did you factor in differences between resident and non-resident tuition rates?

IV. Employment Outcomes and Program Demand (Industry Need)

A. Standard Occupational Code System

Using the federal Standard Occupational Code (SOC) System, indicate the top three occupational codes related to post-graduation employment from the program. A full list of SOCs can be found at <https://www.onetcodeconnector.org/find/family/title#17>.

A list of Alabama's *In-Demand Occupations* is available at <https://www.ache.edu/index.php/policy-guidance/>.

SOC 1 (**required**): 29-0000 Healthcare Practitioners and Technical Occupations

SOC 2 (*optional*): 15-0000 Computer and Mathematical Occupations

SOC 3 (*optional*): 31-0000 Healthcare Support Occupations

Briefly describe how the program fulfills a specific industry or employment need for the State of Alabama. As appropriate, discuss alignment with Alabama's Statewide or Regional Lists of In-Demand Occupations (<https://www.ache.edu/index.php/policy-guidance/>) or with emerging industries as identified by [Innovate Alabama](#) or the [Economic Development Partnership of Alabama](#) (EDPA).

Compared to many cities in the United States, Birmingham is experiencing significant socioeconomic growth that is fueling a burgeoning healthcare entrepreneurial ecosystem. As in other cities, a strong university innovation education program is invaluable to such an entrepreneurial environment. UAB is a critical part of such an ecosystem and functions as the epicenter of healthcare education, clinical, research, and outreach activities. In 2018, UAB enrolled 21,923 students, employed over 23,000 individuals, and counted over 120,000 alumni worldwide. Based on a 2017 study, UAB's annual statewide economic impact exceeds \$7.15 billion and supports more than 64,000 jobs – an average of one out of every 31 jobs in Alabama. The demand for improved patient outcomes is expected to be a significant factor towards the development of AI-assisted solutions enabling accurate patient diagnoses, treatment plans, monitoring of disease trajectories. This program of instruction would represent an investment in the economic development and commercial activity in the city of Birmingham and the state of Alabama.

The proposed AIM degree meets the needs of the growing population of healthcare related technological companies in Birmingham and the state of Alabama, as well as UAB students who will join the Birmingham and Alabama healthcare workforce, including but not limited to, physicians and nurses. It will also help UAB students and faculty who plan to launch their own healthcare ventures and those in other health-related fields who desire specific knowledge and technical skills in advanced AI techniques.

B. Employment Preparation



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Describe how the proposed program prepares graduates to seek employment in the occupations ([SOC codes](#)) identified.

The MS AIM program will prepare students for the AI in medicine workforce using research labs and exposing students to work-based learning activities.

C. Professional Licensure/Certification

Please explain if professional licensure or industry certification is required for graduates of the proposed program to gain entry-level employment in the occupations selected. Be sure to note which organization(s) grants licensure or certification.

There are no applicable professional licensures or industry certifications required for entry-level employment.

D. Additional Education/Training

Please explain whether further education/training is required for graduates of the proposed program to gain entry-level employment in the occupations selected.

There are no applicable education/trainings required for entry-level employment.



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V. Curriculum Information for Proposed Degree Program

A. Program Completion Requirements: Enter the credit hour value for all applicable components (enter N/A if not applicable).

Curriculum Overview of Proposed Program	
Credit hours required in general education	NA
Credit hours required in program courses	27
Credit hours in program electives/concentrations/tracks	6
Credit hours in free electives	NA
Credit hours in required research/thesis	6
Total Credit Hours Required for Completion	33

Note: The above credit hours **MUST** match the credit hours in the *Curriculum Components of Proposed Program* table in Section V.G.

B. Maximum number of credits that can be transferred in from another institution and applied to the program: 0-credit hours

C. Intended program duration in semesters for full-time students: 4 semesters

D. Intended program duration in semesters for part-time students: 8 semesters

E. Does the program require students to demonstrate industry-validated skills, specifically through an embedded industry-recognized certification, structured [work-based learning](#) with an employer partner, or alignment with nationally recognized industry standards? **Yes** **No**

If yes, explain how these components fit with the required coursework.

Associations with AI and research labs across UAB are highly recommended. Students who choose the thesis-option are recommended to participate in advanced AI research activities in collaboration with principal investigators and physician scientists working with medical data across UAB.

F. Does the program include any concentrations? **Yes** **No**

If yes, provide an overview and identify these courses in the *Electives/Concentrations/Tracks* section in the Curriculum Components of Proposed Program Table in Section V.G.

Students may choose between a professional (coursework only) or thesis (coursework plus thesis training/research) academic pathway. With the professional option, students will be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses that are offered by UAB's School of Engineering and the Department of Computer Science (within UAB's College of Arts and Sciences) to explore key contextual areas to develop sub-specialized knowledge for specific AI-supported medical applications.



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In the thesis option, students will engage with a research advisor (PI of any research lab at UAB focusing on the developing of medical AI systems) for six credits (equivalent to two courses) towards hypothesizing, designing, and implementing an AI project relevant to medical applications. The students will receive a qualifying grade after a successful presentation of the conducted research to three faculty members (chosen research advisor + two AIM faculty).

In addition, AI in Medicine aligns with existing strengths at UAB (including the Heersink School of Medicine, Informatics Institute, Computer Science, School of Engineering, and Health Informatics programs in School of Health Professions).



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- G. Please provide all course information as indicated in the following table. Indicate new courses with “Y” in the associated column. If the course includes a required work-based learning component, such as an internship or practicum course, please indicate with a “Y” in the WBL column.

Program Name:	Artificial Intelligence in Medicine (AIM)			
Program Level:	MS			
Curriculum Components of Proposed Program				
Course Number	Course Title	Credit Hours	New? (Y)	WBL? (Y)
General Education Courses (Undergraduate Only)				
Program Courses				
HCI 611	Foundations of AI in Medicine	3		
HI 620	Privacy and Security in Healthcare	3		
HCI 613	Leadership & Ethics for AI in Medicine	3		
HCI 614	Integration of AI Systems in Healthcare	3		
AIM 641	Technical Aspects of Deep Learning in Medicine	3	Y	
AIM 642	AI in Medical Imaging	3	Y	
AIM 643	AI for Biomedical Signals & Critical Systems	3	Y	
AIM 644	Reinforcement Learning for Clinical Decision Making	3	Y	
AIM 645	Advanced Nature Language Processing (NLP) in Medicine	3	Y	
Program Electives/Concentrations/Tracks				
AIM 646	Large Language Model (LLM) Development in Medicine	3	Y	
AIM 647	Explainable AI in Medicine	3	Y	
EE 638	Neural Time Series Data Analysis	3		
EE 626	Computer Vision	3		
CS 680	Matrix Algorithms for Data Science	3		
CS 616	Big Data Programming	3		
CS 675	Data Visualization	3		
Research/Thesis				
AIM 699	MS Thesis Dissertation	6		Y
*Total Credit Hours Required for Completion		33		



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***Note:** The total credit hours should equal the total credit hours in the Curriculum Overview table (V.B, p. 9).

New Academic Degree Program Summary/Business Plan

Use the Excel form from ACHE's Academic Program webpage located at <https://www.ache.edu/index.php/forms/>, named **New Academic Degree Program Business Plan**, to complete the New Academic Program Degree Proposal.

Instructions and definitions are provided in the Excel file. **The New Academic Degree Program Business Plan should be uploaded as an Excel file (.xlsx) in the Academic Program Review (APR) Portal.**

Steps for Submitting the New Academic Degree Proposal

1. Complete the **New Academic Degree Proposal** document.
2. Attach the letters of support from external entities listed in *Section I.D.* at the end of the **New Academic Degree Proposal** document.
3. Save the **New Academic Degree Proposal** document as a **.pdf file**.
4. Complete the **New Academic Degree Program Business Plan** and save as an **.xlsx file**.
5. Login to the Academic Program Review (APR) Portal at apr.ache.edu using your ACHE-provided login information. If you are not a designated user for your institution, contact your designated user.
6. Provide responses to questions in the APR Portal.
7. Upload the **New Academic Degree Proposal .pdf file** in the APR Portal.
8. Upload the **New Academic Degree Program Business Plan .xlsx file** in the APR Portal.
9. Click to "Validate" the proposal and then address any issues with your submission.
10. Once validation is clear, click "Review" to check your responses before submitting. If all looks good, click "Submit" at the bottom of the review screen.
11. The system will then prompt you to "Lock" the submission. Your proposal is considered submitted only once it has been locked within the APR Portal.

➔ **Note: Proposals that have not been locked by the deadline will not be reviewed for inclusion on the next Commission agenda.**

NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY

INSTITUTION: UAB Heersink School of Medicine

PROGRAM: Master's in Artificial Intelligence in Medicine

Select Level:

Master's

ESTIMATED *NEW* EXPENSES TO IMPLEMENT PROPOSED PROGRAM

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	TOTAL
FACULTY	100000	320000	326000	490000	500000	660000	673000	3069000
STAFF	150000	153000	153000	159181	162365	165612	168924	1112082
EQUIPMENT	0	0	0	0	0	0	0	0
FACILITIES	0	0	0	0	0	0	0	0
LIBRARY	0	0	0	0	0	0	0	0
ASSISTANTSHIPS	0	0	0	0	0	0	0	0
OTHER	29000	35000	35000	35000	40000	40000	50000	264000
TOTAL	279000	508000	514000	684181	702365	865612	891924	4445082

NEW REVENUES AVAILABLE FOR PROGRAM SUPPORT

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	TOTAL
REALLOCATIONS	0	0	0	0	0	0	0	0
EXTRAMURAL	0	0	0	0	0	0	0	0
TUITION	279000	511920	812700	1065960	1087020	1233000	1256400	6246000
TOTAL	279000	511920	812700	1065960	1087020	1233000	1256400	6246000

ENROLLMENT PROJECTIONS

Note: "New Enrollment Headcount" is defined as unduplicated counts across years.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	AVERAGE
FULL-TIME HEADCOUNT	Year 1 - No data reporting required	15	20	25	25	30	30	24.16666667
PART-TIME HEADCOUNT	Year 1 - No data reporting required	15	30	40	40	40	40	34.16666667
TOTAL HEADCOUNT	Year 1 - No data reporting required	30	50	65	65	70	70	58.33333333
NEW ENROLLMENT HEADCOUNT	Year 1 - No data reporting required	15	30	45	45	50	50	39.16666667

DEGREE COMPLETION PROJECTIONS

Note: Do not count Lead "0"s and Lead 0 years in computing the average annual degree completions.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	AVERAGE
DEGREE COMPLETION PROJECTIONS	Year 1 - No data reporting required	15	25	40	45	50	50	37.5

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **641** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Technical Introductions to Deep Learning in Medicine**

Short title (30 char) **Tech Intro Deep Lrning in Med**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition Med Fee Code (s): MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time):

List of registration restrictions (specific program, major, department, attribute):

Graduate Level

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

The technical aspects of deep learning in medicine will introduce students to machine learning and deep learning topics that are relevant to the application and development of those techniques in the healthcare domain. These techniques deal with the prediction of labels or real values for unseen objects, based on a set of previously encountered examples, or automated discovery of patterns and commonalities in data. Students will be first introduced to the fundamentals of machine learning and its application to ensure a correct and skillful use of available techniques. We will then focus on deep learning techniques, and how they can be applied in the medical field.

Justification for new course:

The course will explore the use of deep learning in analyzing medical data, diagnosing diseases, and improving patient care. The course will address unique challenges in handling medical data, ethical considerations, and regulatory compliance specific to healthcare. Students will gain hands-on experience with medical datasets, collaborate with healthcare professionals, and delve into advanced topics relevant to the intersection of deep learning and medicine.

New Course Proposal for Submission with New Programs

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **642** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Artificial Intelligence for Medical Imaging**

Short title (30 char) **AI for Med Imaging**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition Mec** Fee Code (s): **MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time):

List of registration restrictions (specific program, major, department, attribute):

Graduate Level

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

The course will cover the design and implementation of advanced AI-based diagnostics and patient monitoring strategies using medical images from various modalities. Students learn specific preprocessing pipelines for various types of medical images; implement AI-based diagnostics as a project using open-source medical image datasets; learn various development and transfer learning strategies of AI models for medical images

Justification for new course:

The proposed course offers students a comprehensive instruction on various medical imaging modalities, preprocessing medical image data, design and implementation of AI models, multimodal approaches towards combining medical image data with electronic health records.

* Please submit a course syllabus with this form

New Course Proposal for Submission with New Programs

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **643** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Artificial Intelligence for Biomedical Signals and Critical Care Systems**

Short title (30 char) **AI for Biomed Signals & CC sys**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition Med** Fee Code (s): **MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time): **None**

List of registration restrictions (specific program, major, department, attribute):

Graduate

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

This course educates learners about artificial intelligence and machine learning applications to various biomedical signals and perioperative time-series data. The course specifically provides a detailed instruction on how to develop AI systems for real-time time-series data from ICU and other critical care systems. The course presents challenges associated with processing biomedical signals from critical care systems and how AI can assist in improving patient monitoring strategies.

Justification for new course:

The proposed course offers an alternative approach to design advanced AI models for critical care systems dealing with multiple biomedical signals in real time. This will provide a practical approach to develop AI systems for perioperative medicine. .

* Please submit a course syllabus with this form

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **644** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Reinforcement Learning for Clinical Decision Making**

Short title (30 char) **Reinfrmnt Lrning for Clin Dec**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition Med** Fee Code (s): **MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time): **None**

List of registration restrictions (specific program, major, department, attribute):

Graduate

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

This course educates students to the components that make up a reinforcement learning problem and to the important concepts to focus on when trying to solve such a problem in the context of clinical decision making. Students learn what are the different properties of a reinforcement learning problem and what are the consequences of these properties with respect to solvability. They learn how to implement these techniques with focus to the clinical domain, and how supervised learning (and specifically deep learning) can be used to help reinforcement learning techniques tackle larger problems.

Justification for new course:

Reinforcement Learning (RL), especially with human feedback (RLHF) are the backbone training mechanism for popular large language models. This course offers an unique perspective of applying reinforcement learning in the context of clinical decision making and utilize the human feedback mechanism to train larger healthcare models for precision patient care.

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **645** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Advanced Natural Language Processing (NLP) in Medicine**

Short title (30 char) **Adv NLP in Medicine**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition MediFee Code (s): MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time): **None**

List of registration restrictions (specific program, major, department, attribute):

Graduate

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

This theoretical course provides the students with the skills and knowledge to understand and develop state-of-the-art solutions for natural language processing tasks in the field of medicine and healthcare. After a short introduction to traditional generative grammars and statistical approaches to NLP, the course will focus on transformers and variations on their architecture (including BERT and GPT), and about which models work best for which tasks, their capacities, limitations and how to optimize these for medical applications.

Justification for new course:

Natural language processing is a vital technology for several healthcare applications. The proposed course will provide theoretical concepts of NLP specifically catered towards healthcare domains and how the students can leverage/translate existing NLP models to medical datasets.

* Please submit a course syllabus with this form

New Course Proposal for Submission with New Programs

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **646** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Large Language Model (LLM) Development in Medicine**

Short title (30 char) **LLM Dev in Medicine**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition** Fee Code (s): **MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time): **None**

List of registration restrictions (specific program, major, department, attribute):

Graduate level

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

This practical course provides the hands-on expertise. Large Language Model (LLM) concepts such as tokenization, text classification, and sentiment analysis to more advanced topics like fine-tuning large language models for domain-specific healthcare applications. Through a blend of lectures, hands-on assignments, and project work, students will gain a deep understanding of the capabilities and constraints of current LLM technologies. They will also delve into the ethical and regulatory considerations unique to deploying LLMs in a healthcare setting.

Justification for new course:

Implementation and integration of Large Language Models (LLMs) in healthcare settings is challenging and computationally expensive. This course delves into providing practical experience for students towards safer implementation of LLMs to domain-specific healthcare applications.

* Please submit a course syllabus with this form

New Course Proposal for Submission with New Programs

New Program Name **Artificial Intelligence in Medicine (AIM)** Planned Start Term **Fall 2024**

Subject Code **AIM** Course Number **647** Credit Hours **3** Level **GR**

Open also to: Graduate Non-Degree Graduate Undergraduate

Title **Explainable AI in Medicine**

Short title (30 char) **Explainable AI in Medicine**

Course is Repeatable for Credit. If repeatable the max hours eligible to apply to program **3**

Number of Contact Hours: Lecture **15** Lab Practicum/Internship/Clinical Online

Schedule Type **Lecture** Tuition Attribute: **TUMD Tuition Med Fee Code (s): MDSF**

List course prerequisites (must be a specific course with associated minimum grades):

None

Co-requisite course (must take at the same time): **None**

List of registration restrictions (specific program, major, department, attribute):

Graduate Level

Default Grade Mode: **Standard Letter** Other non-default grade modes:

Course Description:

In this course, students learn to explain the difference between different explanation approaches (e.g., global versus local models) and to critically choose which are suitable to use based on underlying assumptions and relative advantages and limitations.

Students learn to evaluate the quality and ethical consequences of approaches based on the techniques taught, the understandability of explanations, and demonstrate awareness of the ethical, normative, and social consequences of their applications.

Justification for new course:

AI models often remains less reproducible and not translatable due to its abstractive nature of data processing. However, the decoding of decisions made by medical AI systems is absolutely critical for clinicians to understand the underlying disease pathology. This course will provide students to explore multitude of existing approaches to reveal the decision making process of such AI models.

* Please submit a course syllabus with this form

**Heersink School of Medicine (HSOM)
UNIVERSITY OF ALABAMA AT BIRMINGHAM**

Statement of Approval (to be filled in by proposing faculty member):

By signing this form, I indicate approval of the proposal for a Master of Science Degree in Artificial Intelligence in Medicine. If I am signing in representation of a recommendation forwarded by a committee (faculty or administrative), my signature represents majority approval of committee members.

Proposing Faculty Member(s), Department of Medicine/ Heersink Institute of Biomedical Innovation


Rubin Pillay (Sep 12, 2023 17:08 CDT)
Dr. Rubin Pillay & Signature

09/12/2023
Date

Curriculum & Programs Committee Chairs and Assistant Dean (following recommendations by the Heersink SOM Ad Hoc Graduate Curriculum Committee)


Dr. Cristin Gavin & Signature

09/12/2023
Date

Chair and Senior Associate Dean for Medical Education


Dr. Craig Hoesley & Signature

09/12/2023
Date

September 7, 2023

To: Dr. Rubin Pillay

Re: Letter of Support for the Master of Science in AI in Medicine

On behalf of the UAB Collat School of Business, I want to express our enthusiastic support of the proposal from the UAB Heersink School of Medicine for the Master of Science in AI in Medicine. We appreciate the opportunity to collaborate on this new, innovative approach to delivering educational opportunities in artificial intelligence— a rapidly growing area of the economy that is essential for improving access, equity and improved healthcare. The new graduate program will be a valued complement to our MBA program with a concentration in Health Services.

We look forward to collaborating on curriculum development as many of our faculty have expertise in healthcare leadership, business model innovation, data analytics, innovation and entrepreneurship. We see tremendous opportunities for interdisciplinary faculty scholarship to further advance knowledge in healthcare innovation, social entrepreneurship, digital healthcare, business model transformation and the other topics central to the proposed master's degree.

Also, as the proposed program is implemented, there is the potential for our faculty to participate in development of new courses as well as to work with students on their innovation projects. The innovations envisioned in the online approach to the proposed program will make it accessible to a global audience and will have spillover effects to help inform and transform how we think about graduate education for our MBA and other master's programs in business. In summary, we strongly support this proposed Master of Science in AI in Medicine. We also look forward to its successful implementation and impact locally and globally.



Molly Wasko, PhD
University Professor and Associate Dean
UAB I-Corps Program Director
CSB 205D | Collat School of Business
University of Alabama at Birmingham
205.934.8806 | mwasko@uab.edu

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phone: 205.934.8800

www.uab.edu/business

September 7, 2023

Colleagues:

On behalf of the Department of Health Services Administration in the School of Health Professions, I am writing to share our enthusiastic support of the proposal from the UAB Heersink School of Medicine for a new Masters in AI in Medicine (AIM).

From our perspective, the new graduate program will be a valued complement to our work in the Department of Health Services Administration. We will collaborate to help develop new courses in the proposed program. In addition, one of our currently offered courses (HI 620) is included as a required course in the Masters in AIM's curriculum. Faculty in our department have expertise in health and clinical informatics, data analytics, design science, implementation science, machine learning, user experience, human factors engineering, healthcare strategy, privacy and security, leadership and management. We look forward to collaborating with experts in the proposed program.

As the Masters in AIM is implemented, there is the potential for our faculty to bring expertise to your program as instructors for new courses. We also anticipate offering courses in the new program as electives in some of our existing and future graduate degree programs (Health Informatics, Health Administration, Healthcare Simulation, Health Care Quality and Safety, AI in Health Services, and our doctoral programs). We appreciate the opportunity to collaborate to offer this new, in-depth educational opportunity in AI in Medicine, a rapidly growing area of the economy that is essential for improving health outcomes.

We see the Masters AIM program as a complement to the Masters in AI in Health Services program that we are proposing. Such complementarity will help UAB address the breadth of end-to-end health services and the depth of medicine and health outcomes. Moreover, we see how the blended in-person and on-line approach to your proposed program will make it accessible to a wide range of domestic and international graduate students.

In closing, we enthusiastically support the proposed graduate degree program in AI in Medicine because we believe it has a strong potential for success and it will support our work to develop leaders who will reinvent health care locally, domestically, and globally.

Sincerely,



Jane Banaszak-Holl, PhD
Professor & Chair, Department of Health Services Administration

September 27th 2023

To:
Sandeep Bodduluri, MS, PhD
Director of AI Programs
Marnix E. Heersink Institute for Biomedical Innovation
University of Alabama at Birmingham

Letter of Support for Master of Science in Artificial Intelligence in Medicine (AIM)

Dear Dr. Bodduluri,

On behalf of the Department of Biomedical Engineering (BME), we are delighted to provide this letter of support for the new Master of Science (MS) degree application in Artificial Intelligence in Medicine (AIM). In reviewing the proposal and following conversations with you and the program leadership, it is clear that the proposed MS degree in AIM addresses a critical unmet need. Specifically, there is a shortage of skilled professionals with graduate-level expertise in artificial intelligence with specialized knowledge in healthcare applications that can contribute towards the development of AI-assisted solutions enabling accurate patient diagnoses, treatment plans, and monitoring of disease trajectories. Therefore, we feel that this is both timely and much needed.

The BME department is particularly interested in partnering with you to provide new opportunities to BME graduates and collaborating with you to develop new elective courses in the future. We do not see any overlap with our current BME degree programs and feel that this will be an excellent addition to the graduate degree programs available at UAB. The BME department currently offers a course in Machine Learning that we hope will be useful as an elective for AIM students, and we expect to generate others in the future.

We wish you all the best for successful approval of this new MS degree in AIM.

Sincerely,



Alan Eberhardt, PhD
Professor and Associate Chair of
Education, Department of Biomedical
Engineering



Palaniappan Sethu, PhD
Professor and Program Director,
Engineering Education in Medicine,
Department of Biomedical Engineering

To: Dr. Sandeep Bodduluri, Dr. Rubin Pillay, Dr. Cristin Gavin
From: Leon Jololian, PhD
Re: Letter of Support for Proposed Masters in Artificial Intelligence in Medicine
Date: 09/25/2023

Dear Colleagues,

Following a review of the proposal for the Masters in Artificial Intelligence in Medicine (MS in AIM), I provide this formal evaluation to address the potential merits and areas requiring refinement and clarification in the proposal.

Strengths of the Proposal:

- 1. Addressing Skill Gap:** The proposed MS in AIM would be highly beneficial in addressing the profound demand for professionals trained in the intersection of AI and healthcare. It offers a contemporary solution by arming graduates with pertinent skills required to enhance the medical applications of AI, thus fulfilling a critical need in the evolving landscape of medical technology.
- 2. Alignment with Institutional Goals and Economic Impact:** The proposal aligns harmoniously with UAB's overarching strategy emphasizing research, innovation, and exemplary patient care. This alignment denotes a promising potential to bolster economic growth within Birmingham and extend its influence throughout Alabama.
- 3. Cross-Disciplinary Collaboration:** The solid foundation in engineering, computer science, and healthcare that UAB possesses is a significant asset to the proposed program. It foretells the creation of a rich, interdisciplinary learning environment, facilitating broad-spectrum learning and innovation.

Areas for Improvement:

- 1. Integration of Interdisciplinary Training:** While the proposal illustrates the program's availability to students from diverse academic backgrounds, it necessitates further clarification on the methodologies for integrating interdisciplinary perspectives into the curriculum to foster a comprehensive learning experience.
- 2. Definition of Success Metrics:** The absence of defined key performance indicators to continuously assess the program's strengths is a substantial void in the proposal. A refined approach to measure these strengths over time is crucial for the sustained success and relevance of the program.

3. Ethical Considerations: The singular course allocated for ethics and privacy appears to be inadequate, given the magnitude and intricacy of ethical considerations in healthcare AI. A more expansive approach to ethical instruction and discussions is paramount.

4. Continued Education: The proposal currently lacks provisions or explicit guidance on continued education and training, a crucial component to ensure adaptability and continued proficiency in the fast-evolving domain of AI.

5. Accreditation: Clarification and explicit stating of the program's ambitions regarding accreditation are vital, as this significantly impacts the perceived value and credibility of the program.

Conclusion:

The proposal for the Masters in Artificial Intelligence in Medicine shows substantial promise and is poised to make significant contributions to the field of medical AI and to the academic profile of our university. The noted strengths align well with the strategic vision of UAB and serve to address pivotal needs within the healthcare sector. However, the success and impact of the program hinge on addressing the highlighted areas for improvement, which will provide clarity, reinforce the curriculum, and enhance the overall value and appeal of the program.

We look forward to seeing refinements in the aforementioned areas and to the subsequent development and realization of this program.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Leon Jololian', written in a cursive style.

Leon Jololian, PhD.
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