BOARD OF REGENTS
AGENDA ITEM SUMMARY

Academic Affairs **August 14, 2025**

AGENDA ITEM: Proposal to establish a dual track Master of Science degree in Artificial Intelligence, one track administered by the Department of Computer Science in the College of Information Science and Technology at the University of Nebraska at Omaha (UNO), and one track administered by the School of Computing in the College of Engineering at the University of Nebraska-Lincoln (UNL).

☐ **Review** ☒ **Review + Action** ☐ **Action** ☐ **Discussion**

☐ *This is a report required by Regents' Policy.*

PRESENTERS: David S. Jackson, Interim Provost

PURPOSE & KEY POINTS

The transformative power of Artificial Intelligence (AI) is now widely recognized, poised to reshape every facet of our daily lives. AI's impact spans socio-economic structures, technological ecosystems, global competitiveness, and the future of work. The Master of Science in Artificial Intelligence (MSAI) program is a collaborative initiative between the College of Information Science and Technology at UNO and the College of Engineering at UNL. The program offers two distinct pathways for graduation. Both tracks deliver an extensive foundation in core AI topics, including machine learning, deep learning, natural language processing, generative AI, and game theory, but are designed for different audiences. By offering both a traditional, on-campus format (UNO-based), and an online non-thesis track with 8-week courses (UNL-based), this program will better meet workforce needs by providing options for both traditional and nontraditional students.

The Executive Graduate Council voted to recommend approval on June 17, 2025.

BACKGROUND INFORMATION

Section 2.9 of the Bylaws of the Board of Regents provides that, "No curriculum leading to a degree or certificate shall be adopted…without the approval of the Board."

RECOMMENDATION

The President recommends approval.

SUMMARY-ESTABLISHING A NEW ACADEMIC PROGRAM

CAMPUS AND NAME OF PROGRAM: UNL and UNO Dual Track MS in Artificial Intelligence

Proposed Date of First Offering: Fall 2025

New/Additional Annual Program Costs	Program Management		Brief Explanation
	FTE	Expense	
Faculty*	1.25	$ 227,287.00	This program is collaborative between UNL and UNO with two tracks to serve both traditional and nontraditional students. UNO offers a campus-based program, while UNL offers courses in an online 8-week format.
Staff*	2	$ 76,559.00	
Additional Expenses**		$ 22,471.00	
Total Annual Expense		$ 326,317.00	

*Total salary and benefits at year 5; **Additional costs on an annualized basis estimated for Year 5

AAU Recognition Potential Impact: [ ]Very Negative [ ]Negative [X]None [ ]Positive [ ]Very Positive [ ]Not Applicable

AAU Recognition Criterion Impacted (If any):

Minimum Estimated Program Enrollment (Year 5)

	Enrollment	Credit Hours	Tuition Rate	Income
UNO	48	15	$ 722.50	$ 520,200.00
UNL*	126	12	$ 700.00	$ 1,041,600.00
				$ -
			Total Income	$ 1,561,800
			Net Income	$ 1,561,800

*Average of 6 credits per term, differing projected enrollments for 3 enrollment terms

M E M O R A N D U M

Date: January 28, 2025

To: David Jackson, Interim Executive Vice President and Provost

From: Joanne Li, Chancellor, University of Nebraska at Omaha

RE: Proposed Curriculum- MS in Artificial Intelligence

The University of Nebraska at Omaha (UNO) committees have reviewed and endorsed the creation of a new graduate program.

The UNO Computer Science Department requests the creation of a Master of Science in Artificial Intelligence (MSAI). This new program will capitalize on market demand and student interest in specialized artificial intelligence skills. The proposed degree is intentionally designed as a pathway, with existing programs in our BS Artificial Intelligence and BS Computer Science degrees, to prepare our learners for the rapidly expanding workforce needs in Nebraska. The transformative power of AI is evident in our daily lives, and it is imperative for the urban research university to have this state-of-the-art academic program to prepare AI-ready leaders for our state's workforce.

cc: Phil He, Senior Vice Chancellor for Academic Affairs, Office of Academic Affairs
Martha Garcia-Murillo, Dean, College of Information Science & Technology
Andrea Kessler, Executive Assistant to the Provost, Office of the Provost
Keristiena Dodge, Chief of Staff, Office of the Chancellor
Angie Sargus, Executive Associate, Academic Affairs

University of Nebraska Omaha
Office of the Chancellor
6001 Dodge Street, EAB 201 | Omaha, NE 68182 | 402.554.2419 | unochancellor@unomaha.edu
unomaha.edu

To: Office of Academic Affairs

From: Dr. Martha Garcia-Murillo, Dean of IS&T

Date: December 18, 2024

Subject: MS in Artificial Intelligence

The faculty of the Computer Science Department have proposed creation of a new MS degree in “Artificial Intelligence”. This new program seeks to capitalize on considerable student interest and market demand for learning specialized skills in AI. In particular, the market analysis from ILCI shows that no AI-specific MS program exists within a 200-mile radius of UNO, and there has been a significant growth in graduate AI degree completions in the last five years.

The proposed program is distinct from existing graduate degrees offered by the College of IS&T in terms of its specialized focus on AI but also in its offering of concentration pathways in core AI subfields. The degree is also distinct from the current MS in Data Science jointly offered by IS&T, Arts & Sciences, and Data Science in that its coursework prepares students to advance the state of the art in artificial intelligence technologies while the Data Science program prepares students to apply the tools of data science to problems in domains like business intelligence and corporate leadership.

UNO’s proposed program is also distinct from the concurrent MS AI proposal prepared by faculty in the School of Computing at the University of Nebraska in Lincoln in terms of scope and delivery modality. UNL’s proposed program will be delivered in a distance only format as a non-thesis degree with courses offered in 8-week blocks and a largely fixed curriculum. UNO’s proposed program is structured as a traditional, in-person master’s program with concentration tracks in different areas of the discipline. UNO’s program also is intentionally designed to dovetail with existing bachelor’s programs through the Fast Track mechanism to allow students in the BS Artificial Intelligence or BS Computer Science to earn both their undergraduate degree and the MS AI in an accelerated fashion. These two MS AI programs complement each other well in providing a range of options to Nebraska residents, out of state learners, and international students. Given these distinct missions, we expect that these programs will attract mutually exclusive audiences of students, rather than directly competing in the region.

The proposed MS in AI degree was unanimously approved by the College of IS&T Academic Committee on December 16, 2024. I fully support the creation of this new degree program as outlined in the proposal.

University of Nebraska Omaha

College of Information Science & Technology, Office of the Dean

6001 Dodge Street, PKI 172 | Omaha, NE 68182 | 402.554.2277 | mcarciam@unomaha.edu

https://www.unomaha.edu

December 10, 2024

David Jackson, Executive Vice President and Provost
University of Nebraska
3835 Holdrege Street
Lincoln, NE 68583-0745

Dear EVPP Jackson,

I am forwarding materials related to a proposal to create a new Master of Science in Artificial Intelligence program by the School of Computing in the College of Engineering. The proposed program will be offered online and is expected to be attractive to engineering, computing, and other professionals seeking to advance their careers in this evolving and emerging area. The program requires no permanent investments to establish.

This new program has the full endorsement of the Academic Planning Committee, and Executive Vice Chancellor for Academic Affairs, the Dean of the College of Engineering, the Dean of Graduate Education and it has my approval. I am requesting you approve it and that it be reported to the Board of Regents at an upcoming meeting.

Sincerely,

Rodney D. Bennett
Chancellor

c: Jennifer Clarke, Chair, Academic Planning Committee
Katherine Ankerson, Executive Vice Chancellor
Lance Pérez, Dean, College of Engineering
Witty Srisa-an, Director, School of Computing
Mehmet Vuran, Professor, School of Computing
Josh Davis, VC Inst. Strategy Ext. Rel/Chief of Staff
Renee Batman, Assistant Vice Chancellor
Suzi Tamerius, Project Coordinator
Karen Griffin, Coordinator of Faculty Governance

University of Nebraska Lincoln
Office of the Chancellor
201 Canfield Administration, PO Box 880419 | Lincoln, NE 68588-0419 | 402.472.2116

MEMORANDUM

TO: Academic Planning Committee Chair

FROM: Katherine Ankerson, Executive Vice Chancellor KSA

DATE: November 1, 2024

SUBJECT: Proposal to Create - MS in Artificial Intelligence

Attached please find a proposal to create a new Master of Science in Artificial Intelligence to be administered by the School of Computing in the College of Engineering. The proposed program of study will be offered online and is expected to be attractive to engineering, computing and other professionals who are seeking to advance their career in this evolving and emerging area.

The program is aligned with many of the strategic goals of the college and university, and meets an important workforce need. I am especially appreciative of the efforts to expand access to this training and expertise by offering the program through online and distance education. The marketability of the program is well supported by external data, and the program requires no immediate permanent investments to establish.

This new program has the full support of the College of Engineering faculty and curriculum committees, Dean Lance C. Pérez, Graduate Council and Dean Deb Hope. I fully support this proposal and ask for your review at the earliest possibility.

University of Nebraska Lincoln
Office of the Executive Vice Chancellor and Chief Academic Officer
208 Canfield Administration Building | P.O. Box 880420 | Lincoln, NE 68588-0420 | 402.472.3751 | FAX 402.472.4929

October 28, 2024

To: Renee Batman
Assistant Vice Chancellor and Chief Administrative Officer

From: Debra A. Hope
Associate Vice Chancellor and Dean of Graduate Education

Re: New Degree Master's of Science in Artificial Intelligence CIP Code 11.0102

Attached is a proposal for a new master's degree program in Artificial Intelligence in the School of Computing in the College of Engineering. This will be a fully online program. This program Proposal approved unanimously by the UNL Graduate Council on October 28, 2024. The approval from the Dean of the College of Engineering is included. I also approve this proposal. It will be an excellent addition to our graduate offerings and is well-designed to meet the needs of our Nebraska workforce.

As a next step, I am submitting the proposal and accompanying documents for review by the Executive Vice Chancellor.

University of Nebraska Lincoln
Office of Graduate Studies
101 Seaton Hall | 1525 U Street | P.O. Box 880619 | Lincoln, NE 68588-0619 | 402.472.2875
graduate@unl.edu

October 8, 2024

Debra Hope, Ph.D.
Associate Vice Chancellor and Dean
123A Seaton Hall
Lincoln, NE 68588-0619

Dear Deb:

I am writing to provide my strongest support for the proposal to create a Master of Science in Artificial Intelligence. The proposed degree fulfills a need for working engineering, computing and other professionals who are seeking to advance their careers and stay current with emerging technologies. This online only graduate program complements our other degree programs in the computing fields and meets a statewide, regional and national need for online degrees in artificial intelligence. This proposal is strongly aligned with the strategic plans of the College of Engineering and the University.

Attached to this letter is the proposal that was reviewed and approved by the college and other supporting documents. If you have any questions regarding the proposal, please do not hesitate to contact me.

Sincerely,

Lance C. Pérez, Ph.D., FASEE
Dean, College of Engineering
Omar H. Heins Professor of Electrical and Computer Engineering

University of Nebraska Lincoln
College of Engineering
114 Othmer Hall | P.O. Box 880642 | Lincoln, NE 68588-0642 | 402.472.3181 | FAX 402.472.7792
1110 S. 67th St. | The Peter Kiewit Institute | Omaha, NE 68182-0176 | 402.554.6009 | FAX 402.554.2309
engineering.unl.edu

A PROPOSAL FOR A DUAL TRACK MASTERS PROGRAM

within

the Graduate College
University of Nebraska

MS in ARTIFICIAL INTELLIGENCE

School of Computing
College of Engineering
UNL

Computer Science Department,
College of Information Science and Technology
UNO

By

Graduate Studies
University of Nebraska – Lincoln

and

Graduate Studies
University of Nebraska - Omaha

Proposed Date of the Program: Fall, 2025

Last Revised: Friday, May 5th 2025.

I. Descriptive Information

Name of Institution Proposing New Major or Degree
University of Nebraska-Lincoln (UNL) University of Nebraska-Omaha (UNO)
Name of Proposed Major or Degree
Artificial Intelligence
Degree to be Awarded to Graduates of the Major
Master of Science in Artificial Intelligence
Other Majors or Degrees Offered in this Field by Institution
UNL: BS in Computer Science, BS in Computer Engineering, BS in Software Engineering, MS in Computer Science, PhD in Computer Science, PhD in Engineering specialization in Computer Engineering UNO: BS in Artificial Intelligence, BS in Computer Science, MS in Computer Science, PhD in Computing and Information Sciences
CIP Code *http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55]*
11.0102
Subject Code
CSCE, CSCI, AIML
Administrative Units for the Major or Degree
School of Computing, UNL Department of Computer Science, UNO
Proposed Delivery Site
UNL City Campus UNO City Campus
Program will be Offered *[full program, not individual courses]*
_____ On-campus only _____ Distance only ___**X**___ Both (on-campus and distance)
Program leads to licensure or certification
___**X**___ no _____ yes If yes, explain:
Proposed Date the New Major or Degree will be Initiated
Fall 2025

II. Details

A. Background

The transformative power of Artificial Intelligence (AI) is now widely recognized, poised to reshape every facet of our daily lives. AI's impact spans socio-economic structures, technological ecosystems, global competitiveness, and the future of work. The awarding of 2024 Physics Nobel Prize to AI researchers, the use of AI models for the 2024 Chemistry Nobel Prize, and the recently announced federal initiatives on AI education and workforce development are yet another testament to AI's profound influence. Recent AI breakthroughs, exemplified by innovations like Bard, ChatGPT, Claude, Dall-E, Gemini, LLAMA, Pi, and Sora, have ignited a pressing need for educational institutions to adapt swiftly to the burgeoning field of AI. Universities nationwide are keenly observing AI's profound influence on higher education. The need to prepare a future workforce that is proficient in the fundamentals of AI and that is aware of the opportunities as well as the challenges posed by the AI technologies is urgent. Advances in AI are progressing at a super-exponential pace. It is imperative for the NU to offer state-of-the-art AI programs to better prepare our students creating AI specialists who will emerge as leaders of the future AI-ready workforce.

The School of Computing (UNL) and the Computer Science department (UNO), the joint designers of this proposal, unequivocally believe that a new MS degree in AI (MSAI) is the appropriate curricular pathway to prepare the future professionals and researchers in AI, and that the faculty in these units are uniquely qualified, and well-equipped to deliver such a degree. This cross-campus, dual-track, MSAI degree will be the first-of-its-kind across the Nebraska University System and the first such degree across the Nebraska University (NU) system. A timely assessment and launching of the MSAI degree will enable NU to serve the larger Midwest region by partnering with AI related small businesses, availing state and federal government AI workforce development opportunities, and engaging the community and making them aware of the advances and emerging developments in the field of AI.

B. Purpose of the Proposed Major or Degree

The MS in Artificial Intelligence (AI) is designed to equip both current and aspiring computing professionals with a foundational understanding of AI along with a practical proficiency in exploiting AI technologies to develop holistic AI solutions for their respective fields. The courses in this program cover core AI topics such as an introduction to AI, constraint processing, machine learning, deep learning, natural language processing, data mining, game theory, and information retrieval. Students have the option to focus on applying AI techniques to other disciplines including data science, cognitive science, engineering, and business to address complex AI challenges. The primary objectives of this program are:

- *Foundation in core AI*: Ensure that students develop a solid understanding of the fundamental principles of AI, including introduction to AI, constraint processing, machine learning, deep learning, natural language processing, neural networks, game

theory, multiagent systems, image processing, data mining, information retrieval, and computer vision.

- *Hands-on experience with AI tools and technologies*: Emphasize the application of AI across different sectors, such as healthcare, engineering, commerce, agriculture, media, finance, robotics, and autonomous systems, to solve practical problems.

- *Research and innovation*: Equip students with the skills needed to conduct cutting-edge industrial research in AI and contribute to advancements in the field.

- *Ethical and responsible AI development*: Foster an understanding of the ethical, legal, and societal implications of AI, with a focus on fairness, accountability, and transparency.

- *Close the skills gap*: Address the increasing demand for AI specialists in the state, ensuring a steady pipeline of skilled professionals.

- *Increase career opportunities through lifelong learning*: Enhance the expertise and employability of the workforce, empowering professionals to advance their careers or transition into AI-focused roles. Foster a commitment to lifelong learning to stay ahead of the fast-evolving advancements in AI and emerging technologies.

The mission of the MSAI program is to produce "AI-specialists/leaders" to meet the exploding demand of AI related jobs across the nation. The program is tailored to meet the demand and needs of academia, government, and industry for a future AI-ready workforce that can contribute to the socio-economic landscape of the state of Nebraska. The proposed program also offers opportunities for our undergraduate students majoring in Computer Science, Computer Engineering, Software Engineering, and Data Science to pursue advanced studies, diving deeper into essential AI concepts beyond the foundational knowledge provided in their technical electives or undergraduate AI focus area. The proposed program of study will prepare students through didactic courses teaching the foundational principles of AI, hands-on experiences through internship and independent studies, and projects/labs using latest AI technologies, theses and thesis-equivalent projects with high standard of scientific and professional merits, and practical capstone term projects with business and government clients.

The educational goals of this program are to graduate students who:

- Attain a successful professional career in AI or related fields. Design and implement AI systems and AI-driven technologies to push boundaries of technological innovation and research, solve real-world problems, ethical decision making, empathy, enabling organizations to meet the opportunities and challenges of an AI-driven economy and improve the lives of people, communities and societies.
- Provide leadership, integrate multiple perspectives, mentor, and take responsibility for ethical and safe data collection and governance of data in emergent AI systems.

- Adapt successfully to the rapidly evolving AI landscape through life-long learning, community engagement, and endeavor to make AI technologies work for the larger social good.

C. Brief Description of The Program

The Master of Science in Artificial Intelligence (MSAI) program is a collaborative initiative between the College of Information Science and Technology at UNO and the College of Engineering at UNL. The program offers two distinct pathways for graduation: an on-campus pathway (Track A) and an online pathway (Track B) which will have limited competition for studenst in the Great Plains region. Currently, four MS in AI programs are available in the region—offered by the University of Colorado, Saint Louis University, Oklahoma Christian University, and South Dakota School of Mines and Technology. The proposed program will be the first in Nebraska and is uniquely designed to serve a) on-campus undergraduate and graduate students, and b) provide an efficient pathway for computing professionals. The programmatic details and projected enrollments for both tracks are given later in the proposal.

Each track is designed to meet the unique needs and schedules of its audience. The on-campus option follows a traditional 16-week semester and offers a broad curriculum with pathways to complete a thesis, project, or capstone. Additionally, UNO's current CS and AI undergraduates can fast-track into the MSAI program, earning both their BS and MS degrees within five years. Both tracks have the graduation requirement of 30 credit hours. The on-campus pathway (Track A) can be completed in two years with an affordable cost of about $21,675, inclusive of project and thesis options. In contrast, the online pathway (Track B) features an 8-week course format, allowing computing professionals from anywhere to enroll in up to two non-overlapping courses per 16-week semester. As a course-only program, it enables students to complete the degree in approximately two years at an affordable cost of about $21,000.

Both tracks deliver an extensive foundation in core AI topics, including machine learning, deep learning, natural language processing, generative AI, and game theory. They also delve into a variety of AI applications including computer vision, the Internet of Things, robotics, business intelligence, and linguistics. Moreover, to enable participation by students without a prior computing background, we offer a bridge program featuring two primer courses in Python programming and data structures and algorithms for informatics. These courses are provided online through UNL every semester to ensure they are widely accessible and compatible with both tracks in the degree program. These complementary tracks provide synergistic learning opportunities tailored to individuals at different career stages and with diverse professional aspirations. Together they form a framework for advancing AI education in Nebraska while positioning the University of Nebraska as a leader in graduate education in this emerging and rapidly evolving field. For example, graduates of the recently established BS in AI program who are employed full-time may find the online Track B attractive. With its career-aligned, fully online curriculum, Track B also serves as an attractive pathway for professionals looking to add AI expertise to their portfolio. On the other hand, Track A is designed for BS AI students pursuing a joint BS/MS degree and for full-time resident students engaging in master's-level research through theses and projects, thereby fostering a pipeline of doctoral candidates for the university. This novel degree program will drive innovation and economic growth across the state of Nebraska and beyond.

Below is an overview of the distinct strategies and features adopted by the two tracks for this degree program:

	Features/Aspects	Track A	Track B
1	Audience	On-campus undergraduate and graduate students, local computing professionals, non-computing students	On-line students, working professionals, out-of-state students, non-computing students
2	Mode of instruction	On-campus, in-person	Asynchronous on-line
3	Geographical focus	Omaha Metropolitan and neighboring regions	Nebraska and national/international
4	Educational Mission	Postgraduate education for BS/BA/BE graduates in AI, CS/CE, IT, relevant disciplines	Focused on advancing the skills of computing workforce
5	Model of Course Offering	Regular 16-week semesters	Three (3) credit hours course offering over an 8-week period
6	Graduation credit hours	30	30
7	Graduation Requirement	Master's degree with thesis, thesis equivalent project, and capstone course options	Non-thesis master's degree: Course-only with comprehensive exam
8	Multi-/Inter-disciplinary Coverages	Seven concentration areas with potential for expansion	Eight courses covering core AI areas
9	Course selections	20+ courses	13+ courses
10	Existing AI degree programs in place	BS in AI and Ph.D. in AI concentration in place	No BS in AI or other specialized AI degree programs

The two tracks – MSAI (Track A) and MSAI (Track B) in the proposed degree program are described in details in Sections III and IV.

D. Resources for Implementation and Maintenance

1) Current Expertise and Faculty Support

The proposed MSAI program is built on the strong educational infrastructures, research resources, and successes of College of Information Science & Technology at UNO and College of Engineering at UNL. Collectively, the colleges have an ensemble of successful undergraduate and graduate programs including several computing related Bachelor Degrees in Computer Science, AI, Bioinformatics, Data Science, Software Engineering, and Computer Engineering. The proposed MSAI serves as a natural educational pathway for

the graduates of these programs, as well as graduates from the other programs within and outside of NU system.

The new MSAI program will make use of many existing graduate courses in existing programs. The program can start in Fall 2025 and maintained for at least five years with support from at least 30 existing faculty in the Department of Computer Science at UNO and the School of Computing (SoC) at UNL, who currently teach proposed courses in the MSAI. For Track A, development of the MSAI courses will focus on the reorientation and adjustment of the existing courses for the core and the thesis/project requirements as well as develop new AI capstone, AI Morality and Norms, and AI in Science special topics courses. Thus, the program would require *a new* 1.0 FTE faculty effort per academic year. For Track B, SoC currently has 13 pre-tenure faculty. They will have additional teaching capacity once they are promoted and tenured. Furthermore, both colleges also focus its hiring efforts on AI so we can anticipate futher hires to participate in the program as well.

2) Physical Facilities, Equipment and Informational Resources

While no new additional physical facilities are needed for this program, the MSAI-Track A program will need computers equipped with open-source software. While most of the AI software platforms are available free of charge, some of the AI tools with API support impose nominal charges for their uses. These could be covered through existing Technology Fees assessed on both campuses.

Holland Computing Center (HCC) is a high-performance computing resource that is shared by both UNL and UNO campuses. HCC is being used for AI courses and AI projects. For GPU accessibility, the two tracks across the UNO and UNL campuses will continue to use the resources provided by HCC. Students will also be able to use the Scott Technology Center, and AI labs and their GPU machines. Shared dedicated GPU servers may be acquired to address equipment shortages as the enrollments increase in the long-term. For GPU accessibility, both units will continue to use support from Holland Computing Center (HCC). In addition to technology fees, some of these proposed courses have previously approved additional lab fees that can help with reinvestment into GPU resources for HCC. Students will also be able to use Scott Technology Center, AI labs and their GPU machines for at least the first 5 years. Shared dedicated GPU servers may be acquired to address equipment shortages as the enrollments increase in the long-term.

3) Budgetary Considerations

Track A: The MSAI Track A program can be launched with minimal added cost to the College of IS&T over its first five years. Key projected expenses include:

- **Faculty Costs:**
    - 1 FTE faculty starting in Year 2 to teach dedicated AI courses (~$130,000 base + 28% fringe, 3% annual increase).
    - 0.25 FTE added in Year 5 for graduate program coordination.
- **Graduate Assistantships:**
    - Starting in Year 3, 1 GA per ~25 students, including stipend, tuition remission (15 credit hours/year), and health insurance.
- **Advising Support:**

- Based on a $60,000 advisor salary (+ fringe and 3% annual increases), costs are proportional to enrollment (~250 students per advisor).

- **Additional Costs:**
  - $4,000 total for marketing over five years.
  - $1,500 annually for faculty professional development starting Year 2.

Overall, existing MS CS course infrastructure absorbs most instructional needs, keeping incremental costs low.

The CCPE revenue table assumes that the sole source of support for this program will be tuition and fees directly generated by students in the program. For Track A, tuition is projected based on estimated annual enrollments (see Table 1 in section E) with an average credit load of 15 credits per year per student and a weighted tuition rate of $722.50 per credit hour respectively assuming 50% resident and 50% non-resident SCH.

Track B: The MSAI Track B program can be launched with minimal added cost to the College of Engineering over its first five years. Key projected expenses include:

- **Faculty Costs:**
  - We will use existing and new hires in AI area to deliver the program. The Excutive Vice Chancellor office will offer $6,000 stipend for the development of each on-line course and instructional designer support.
- **Graduate Assistantships:**
  - The financial model of the on-line program shares significant revenue with the college. This revenue will be used to support graduate assistants.
- **Advising Support:**
  - The COE and SOC will also provide a team of advisors to ensure that students making good progress toward graduation. The cost to the college is 0.15 service FTE for a faculty member to take on the role of graduate faculty coordinator.
- **Additional Costs:**
  - The Executive Vice Chancellor office will perform market research and conduct marketing campaign for the program.

The CCPE revenue table assumes that the sole source of support for this program will be tuition and fees directly generated by students in the program. For Track B, tuition is projected based on estimated annual enrollments (see Table 2 in section E) with an average credit load of 6 credits per semester per student and a fixed tuition rate of $700 per credit hour.

E. Enrollment Projections

Based on the university Program Development Guide (https://www.unomaha.edu/academic-affairs/_files/documents/curriculum/program-unit-development-guide-2023.pdf), the CCPE threshold for viability is 5 graduates per year. We believe the MSAI program can easily achieve this. Since the MSAI program will be implemented predominantly using the existing faculty in the Computer Science Department and the School of Computing, the minimum number of students required to make the program fiscally viable is very low. There is very little risk of required classes getting cancelled due to low enrollment, and historical enrollments have been strong (ie.,30-40 students per course section). For Track A, if the capstone course which is unique

to the track is offered only once a year, as few as 10 students per admission cohort would be needed to meet UNO's current minimum scheduling guidelines.

For Track A, we conservatively estimate 10-20 new students being admitted to the program annually, which is similar to the organic growth rates of recent BS program launches in IS&T. With a more deliberate marketing campaign about the new program regionally within OUR tuition states, there is potential for significantly more aggressive growth. Additionally, our enrollment projections estimate that that between 5-7 students already at UNO will change majors into the AI degree program. The College of IS&T admits over 50 graduate students a year. We anticipate this interdisciplinary MS program to attract students from several other majors across UNO. The table below shows enrollment and graduation projections for the first five years while assuming a conservative year-to-year estimated retention rate of 90%. In total, we believe the program has the potential to reach 40-50 total enrolled students by the 2029-2030 academic year.

Table 1: Five Year Enrollment and Graduation Projections (Track A)

	2025-26	2026-27	2027-28	2028-29	2029-30
Continuing Students	0	4	9	14	18
New Admits	5	10	15	20	30
Total Enrolled	5	14	24	34	48
Graduates	0	4	9	14	18
Est. Retention Rate	90%	90%	90%	90%	90%

For Track B, we take new enrollment every semester including summer. As such, we provide a projected enrollment based on the historical enrollment record of a similar on-line program in the College of Engineer (Online MS in Engineering Mangagement). We expect 80% retention rate and 30 new admitted students every semester.

Table 2: Five Year Enrollment (Track B)

Year	Fall	Spring	Summer
2025-2026	20	41	66
2026-2027	90	114	122
2027-2028	126	126	126
2028-2029	126	126	126
2029-2030	126	126	126

F. Evidence of Need and Demand

National and Regional Growth in AI Education: According to the 2024 Stanford AI Index Report, the number of AI university degrees offered in English has tripled since 2017, with 54.97% of these being master's degrees. Between 2011 and 2021, AI-related master's degree conferrals doubled, with a peak growth rate of 25%. From 2019 to 2023 alone, completions in

AI-related master's programs increased 258%, reaching 935 completions across 35 institutions.

The Integrated Postsecondary Education Data System (IPEDS) also confirms the rapid expansion of AI-related education. From 2018 to 2022, undergraduate degrees in artificial intelligence (CIP Code 11.0102) grew 845%, while overall computer science-related undergraduate degrees rose 35% nationally and 21% regionally in Nebraska. This demonstrates a strong pipeline of students well-prepared for graduate-level AI education.

In the regional market within 200 miles of Omaha—covering Kansas City, Sioux City (SD), Des Moines (IA), and Kearney (NE)—no public institution currently offers a dedicated AI master's program. This absence represents a unique opportunity for UNO to lead AI education in the area. In 2023, over 5,500 master's degrees in computer and information sciences were awarded within this region, while only 137 AI-related completions were recorded—reflecting a 3,325% increase since 2019.

Industry Demand and Employment Outlook: The demand for AI professionals is acute and growing rapidly across industries such as financial services, healthcare, defense, technology, media, and government. The World Economic Forum reported a 450% increase in AI demand since 2013 and projected 40% growth in AI-related jobs from 2023–2025. IDC forecasts global spending on AI systems to reach $97.9 billion by the end of 2023, with a five-year compound annual growth rate (CAGR) of 28.4%.

LinkedIn data highlights AI Specialist as the #1 emerging job in the U.S., showing a 74% annual increase in job postings over the past five years. Between September 2023 and August 2024, there were 23,758 AI-related job postings from 3,825 employers, with a median advertised salary of $162,700.

According to the U.S. Bureau of Labor Statistics, computing-related occupations are expected to be the second fastest-growing occupational group from 2023 to 2033, with a projected growth rate of 12.9%. Specific to AI, job demand in Nebraska alone included over 4,000 postings in 2022.

Online Education Trends and Competition: Online AI graduate programs are becoming increasingly prevalent, especially since 2022. New online offerings have emerged from institutions such as Purdue, Syracuse, MIT, Duke, UT Austin, Penn State, University of Michigan, and Colorado State Global. These trends underscore the necessity for competitive online and hybrid delivery options in the MSAI program at UNO.

NU's online MSAI program can fill a crucial gap, particularly in the central U.S. region (CO, IA, KS, MN, MO, MT, ND, NE, OK, SD, WY), where competition is limited but demand is rising. There is a significant opportunity to contribute to national AI degree completions through accessible, flexible delivery formats.

Skills in Demand: Analysis of national job postings (August 2023–August 2024) showed:

Software Engineering – 49,647 postings (36%)
Software Development – 44,290 postings (32%)

Python – 42,555 postings (31%)
Agile Methodology – 38,776 postings (28%)
Amazon Web Services (AWS) – 25,807 postings (19%)
Scalability – 24,492 postings (18%)

These postings reflect the growing integration of AI technologies in core software development practices, signaling an urgent need for specialized AI education.

Table 3: Occupational Outlook Information

Occupation	2024 Jobs	Annual Openings	Median Earnings	Growth (2024–2033)
Software Developers	557,121	49,328	$63.39/hr	+25.78%
Computer and Info Systems Managers	165,024	14,860	$81.24/hr	+19.09%
Computer Systems Analysts	125,895	9,687	$49.79/hr	+13.12%
Computer and Info Research Scientists	13,780	1,309	$69.75/hr	+23.00%

G. Centrality to the Role and Mission of UNO and UNL

The proposed Master of Science in Artificial Intelligence (MSAI) program strongly aligns with the missions and strategic goals of both the University of Nebraska–Lincoln (UNL) and the University of Nebraska at Omaha (UNO), as well as the broader University of Nebraska system.

Access, Affordability, and Outreach: Both institutions are deeply committed to expanding access to high-quality, affordable graduate education. The MSAI program will provide flexible pathways for students, including non-traditional learners, working professionals, and those in rural or underserved areas. UNO's mission to serve the metropolitan Omaha area and UNL's statewide outreach efforts converge in this program, making advanced AI education accessible across Nebraska through both in-person and online delivery formats.

Workforce and Economic Development: The MSAI program directly supports Nebraska's economic and workforce needs by preparing graduates for high-skill, high-demand, high-wage (H3) careers in sectors such as agriculture, healthcare, manufacturing, insurance, finance, and education. It also contributes to reskilling and upskilling current professionals to remain competitive in the evolving digital economy. This effort aligns with both UNL's land-grant mission to serve the state and UNO's metropolitan mission to retain talent and drive local innovation. As UNO Chancellor Joanne Li noted, "Investing in UNO is investing in Nebraska's workforce"—a sentiment equally applicable to this joint effort.

Student-Centered and Career-Oriented: Rooted in student success, the MSAI program supports the College of Information Science & Technology's mission at UNO to place students at the center of its efforts while advancing academic excellence and external collaboration.

Similarly, UNL's commitment to preparing graduates for the future of work is reflected in the program's emphasis on applied learning, interdisciplinary training, and career-aligned competencies. With six flexible concentrations and industry-relevant coursework, the program addresses the rising influence of AI in all sectors of the economy.

Innovation, Research, and Community Impact: The MSAI program fosters innovation by advancing both theoretical and applied AI research that addresses real-world challenges—from precision agriculture and rural development to public health and smart infrastructure. Consistent with UNL's tradition of applied research and extension services, the program will support community partnerships, develop AI-driven tools, and contribute to public-sector modernization. At UNO, the program reinforces efforts to build nationally recognized, practice-oriented graduate programs that bridge academic theory and practical impact.

Institutional Collaboration and Leadership: This program will strengthen collaboration across campuses, departments, and external partners. It builds on existing initiatives such as UNO's MS in Computer Science Education and Graduate Certificate in Machine Learning, and UNL's outreach through its advisory boards and research centers. By engaging stakeholders—including K–12 educators, local businesses, and industry leaders—the program remains adaptive to state needs and advances the University of Nebraska's leadership in STEM and AI education.

Equity, Ethics, and the Public GoodL Finally, the program promotes the ethical development and deployment of AI technologies. Students will be trained not only to master the technical aspects of AI but also to understand and mitigate potential biases, ensuring AI serves all communities equitably. These goals align with both institutions' commitments to diversity, inclusion, and serving the public interest.

In summary, the MSAI program reflects and reinforces the shared missions of UNO and UNL: expanding access, developing talent, driving innovation, and serving Nebraska's communities. It is a strategic step toward ensuring that both institutions continue to lead in AI education and research while addressing critical workforce and societal needs.

H. Relationship of the proposal to the NU 5-year strategy

The proposed MSAI program aligns with the University of Nebraska's strategic priorities, including access and affordability, talent development, diversity and inclusion, and collaborative partnerships. By offering an affordable pathway to advanced education in artificial intelligence, the program expands access for students across Nebraska—including those from high schools, community colleges, and transfer institutions—preparing them for high-tech careers. It directly supports the state's workforce needs by addressing the projected 34,000 annual openings in high-skill, high-demand, high-wage (H3) jobs.

In addition to technical training, the program emphasizes the development of ethical and equitable AI systems, preparing future specialists to recognize and mitigate algorithmic bias that can affect diverse communities. This commitment to responsible innovation will help ensure AI technologies serve the broader public good.

The MSAI program also strengthens NU's partnerships with government, industry, and academia by developing a competitive AI workforce and opening new avenues for collaboration, including scholarships supported by UNO and UNL alumni. Moreover, it

establishes a foundation for future graduate offerings—such as the planned online MS in Data Science (to be jointly delivered by the Departments of Mathematics, Statistics, and the School of Computing)—and other interdisciplinary programs focused on applying AI in transportation, precision agriculture, healthcare, insurance, and financial technology.

I. Consistency with the Comprehensive Statewide Plan for Postsecondary Education

Meeting Student Needs: The proposed MSAI program offers flexible paths to an AI degree. This design allows students to customize their learning experience based on their interests and career goals, enhancing both academic engagement and employment prospects.

Meeting State Needs: As AI becomes increasingly embedded in both urban and rural economies, the MSAI program responds to Nebraska's growing demand for professionals equipped to navigate the technical and ethical challenges of AI. With accelerated industrial adoption—especially over the past two years—this program supports workforce development and positions the university as a proactive partner in advancing the state's economic resilience and innovation capacity.

Building Exemplary Institutions: By launching one of the first interdisciplinary AI master's degrees among its peers, University of Nebraska strengthens its leadership in graduate education. The MSAI program bridges the gap between practice-focused associate degrees emerging from community colleges and research-intensive graduate programs offered by major universities. It delivers a balanced education in AI theory and application, reinforcing NU commitment to excellence and innovation.

Advancing Education through Partnerships: The MSAI program will expand on NU existing partnerships with K–12 educators and local industries. Currently, both UNO and UNL have already helped train Nebraska teachers—an effort accelerated by LB 1112. By integrating AI-focused electives (e.g., *AI for Teachers*), these programs can help develop early AI literacy in schools. At the same time, input from industry partners—who helped shape offerings like cloud computing courses and the Graduate Certificates in Machine Learning and Computational AI—continues to guide the program's evolution, ensuring alignment with workforce needs.

Alignment with CCPE Priorities: The proposed program directly supports the Coordinating Commission for Postsecondary Education (CCPE)'s goal to increase the number of STEM professionals equipped to meet local workforce demands. It addresses a critical shortage of AI-skilled workers while promoting efficiency by leveraging existing faculty expertise and infrastructure, including those supporting nationally ranked online graduate programs such as the MBA and Master of Engineering Management.

J. Comparison between MSAI Track A (UNO) and Track B (UNL):

While both tracks are part of a unified MSAI degree under the University of Nebraska system, they serve distinct audiences and delivery formats:

- **Track A (UNO):**

- Follows a traditional graduate model with options for thesis or project-based research.
- Offers face-to-face and hybrid course formats suitable for full-time students and local professionals.
- Emphasizes academic depth and flexibility through on-campus engagement and advanced research opportunities.

- **Track B (UNL):**
  - Fully online and structured around 8-week intensive courses designed for working professionals.
  - Optimized for flexibility, rapid skill acquisition, and career advancement in applied AI fields.
  - Does not offer a thesis track, making it ideal for students focused on practical application rather than research.

Inter-Track Synergies: Despite their differences, Tracks A and B are complementary. Together, they offer a comprehensive AI education strategy across the University of Nebraska system. This dual-track model allows the system to:

- Serve a diverse student population, including traditional graduate students, working professionals, and career-changers.
- Map select courses across both tracks to create flexible pathways for learners who may wish to switch modalities or specialize further.
- Strengthen the state's AI talent pipeline through coordinated program design, shared resources, and consistent academic standards.
- Transfers of courses between tracks will be allowed but considered on a case by case basis due to the structural differences between the two tracks and the distinct audiences that they serve. A maximum of two courses will be eligible for transfer, and these transferrable courses must be offered by both the tracks.
  - Example: A similar and transferrable course across the two tracks is: CSCI 8480: Multi-agent Systems and Game Theory from Track A and the course CSCE 822: Introduction to Game Theory.

III. MS in AI In-person Program at the UNO Campus – MSAI (Track A)

A. Admission Requirements

The criteria and procedures for admitting students into the Track A MSAI program adhere to those required for graduate admission at UNO. These criteria are described in UNO's website https://www.unomaha.edu/office-of-graduate-studies/admissions/index.php. These requirements along with Undergraduate diploma or certificate, and other application materials would be evaluated for admission to the University.

- The minimum undergraduate grade point average (GPA) requirement for the MSAI Track A program is 3.0 or equivalent score on a 4.0 scale. Applicants should have the equivalent of a four-year undergraduate degree.
- English Language Proficiency: Applicants are required to have a command of oral and written English. Those who do not hold a baccalaureate or other advanced degree from the United States, OR a baccalaureate or other advanced degree from a predetermined country on the waiver list, must meet the minimum language proficiency score requirement in order to be considered for admission.
    - Internet-based TOEFL: 80
    - IELTS: 6.5
    - PTE: 53
    - Duolingo: 110

In addition to transcripts for all prior institutions of higher education attended and language proficiency scores (if applicable), prospective students will submit the following materials:

- A detailed resume indicating prior work experience and background.
- One optional letter of recommendation from a reference who can evaluate prior work and/or academic achievements.

B. Major Topics

Major topics of this program include Generative and AI, Machine Learning, Natural Language Understanding, Computer Vision, Robotics and reinforcement learning, Predictive Data Analytics, Data Mining and Knowledge Representation and Discovery, AI/IT Ethics, Constraint Satisfaction and Optimization, Reasoning and Uncertainty, and Mathematical Foundations, including Statistics and Linear Applied for AI, Fundamentals, Principles, and Algorithmic Concepts of AI.

Track A program allows multiple pathways and electives for students to tailor programs integrating foundational aspects of AI with business, computer science, education, information systems, math, philosophy, natural/physical sciences, and social impacts. Students in Track A program can pursue an AI concentration area of emphasis and choose courses from the corresponding elective course group. Six concentration areas are initially designed in the program and described in the following sections of this document.

The Track A program provides an opportunity for students to participate directly in the AI practices with our business and industrial partners through the graduate internship and independent study courses to gain hands-on experiences in the processes of applying the knowledge learned from classrooms to the real-world problem solving. Students in the Track A program are also required to enroll in and complete a thesis, a thesis-equivalent project, or a capstone course that require the students to engage in a scientific research and exploration at the frontier or cutting-edge of AI technology.

Please see the next section and Appendix II of this proposal for courses to be offered by the Track A program with a detailed discussion of these topics.

C. Program Structure

A total of **30** credit hours is required for Track A, with 9 credit hours of core coursework, a required 12 credit hour concentration, 3 to 6 hours dedicated to completion of one exit option pathway, and between 3 and 6 hours of elective coursework depending on the exit option selected. At least 15 credit hours must consist of graduate only 8xx0 coursework.

Track A offers three exiting course options for a completion of the program:

A. A Thesis of 6 credit hours,

B. A Thesis Equivalent Project of 6 credit hours, and

C. A Capstone course of 3 credit hours.

Total credit hour distributions of these program options are listed below.

MS in AI-Track A Requirements

Code	Title	Credits
Core Courses - Complete All		**9**
CSCI 8456	PRINCIPLES OF ARTIFICIAL INTELLIGENCE [1]	
CSCI 8110	ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE	
CSCI 8450	ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING	
Required Concentration - Select a Concentration (see below)		**12**
Exit Option - Select One Path		**3 - 6**
Thesis Option - Complete 6 hours of thesis credit distributed over at least two terms		
AIML 8990	Thesis in AI	
Project Option - Complete 6 hours of project credit distributed over at least two terms		

MS in AI-Track A Requirements

Code	Title	Credits
AIML 8960	Thesis Equivalent Project in AI	
Capstone Option - Complete 3 hours of capstone credit		
AIML 8910	MSAI Capstone	
Elective coursework as necessary to reach 30 total hours selected from the following:		**3 - 6**
AIML 8xxx	Any AIML graduate courses may be used as electives if not applied elsewhere in the plan of study.	
CSCI 8xxx	Any CSCI graduate courses may be used as electives if not applied elsewhere in the plan of study.	
BIOI 8850	SPECIAL TOPICS IN BIOINFORMATICS	
BMI 8400	LINEAR ALGEBRA FOR ADVANCED COMPUTING AND AI	
CYBR 8080	SPECIAL TOPICS IN CYBERSECURITY	
CYBR 8410	DISTRIBUTED SYSTEMS AND NETWORK SECURITY	
ISQA 8016	BUSINESS INTELLIGENCE	
ISQA 8736	DECISION SUPPORT SYSTEMS	
ISQA 8030	INFORMATION SYSTEMS AND ETHICS [2]	
Total Hours Required		**30**

[1] Students who have taken CSCI 4450 or CSCI 8456 with a grade of “B-" or better before entering the MSAI program can replace this course with an elective course of 3 credit hours.

[2] ISQA 8030 may be used to meet elective credit requirements in the MS AI program with permission of both the AI and MIS graduate program committees.

D. Concentration Areas of Study

Students enrolled in the Track A program must select an **area of concentration** for 12 credit hours within their program. Track A program provides the following concentrations at its initial offering

1. *Fundamentals of AI*
2. *Nature Language Understanding*
3. *Machine Learning*
4. *Computer Vision*

5. *Robotics*
6. *Data Analytics*

Recognizing that AI impacts multiple disciplines, we anticipate that new concentrations will be added to the program after it is approved. This will enable students to specialize according to their interests (e.g., AI in Cybersecurity, AI in Health, AI in Engineering Design, etc.) and the rapid advancement of AI technologies as well as the emergence of new applications.

1. ***Fundamentals of AI Concentration Requirements (12 credit hours)***

Code	Title	Credits
Required Courses - complete all:		**3**
CSCI 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
Complete 9 additional hours selected from:		**9**
CSCI 8050	ALGORITHMIC GRAPH THEORY	
CSCI 8590	FUNDAMENTALS OF DEEP LEARNING	
CSCI 8666	AUTOMATA, COMPUTABILITY, AND FORMAL LANGUAGES	
AIML 8950	Graduate Internship in AI	
AIML 8970	Independent Study in AI	
ISQA 8156	ADVANCED STATISTICAL METHODS FOR IS&T	
ISQA 8700	DATA MINING: THEORY AND PRACTICE	
STAT 8730	ADVANCED STATISTICAL MACHINE LEARNING	

2. ***Natural Language Understanding Concentration Requirements (12 credit hours)***

Code	Title	Credits
Required Courses - complete all		**3**
CSCI 8360	MACHINE LEARNING FOR TEXT	
Complete 9 additional hours selected from:		**9**
CSCI 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
CSCI 8476	PATTERN RECOGNITION	
CSCI 8590	FUNDAMENTALS OF DEEP LEARNING	

Code	Title	Credits
CSCI 8666	AUTOMATA, COMPUTABILITY, AND FORMAL LANGUAGES	
AIML 8950	Graduate Internship in AI	
AIML 8970	Independent Study in AI	
MATH 8456	INTRODUCTION TO MACHINE LEARNING AND DATA MINING	
STAT 8730	ADVANCED STATISTICAL MACHINE LEARNING	

3. Machine Learning Concentration Requirements (12 credit hours)

Code	Title	Credits
Required Courses - complete all		**3**
CSCI 8590	FUNDAMENTALS OF DEEP LEARNING	
Complete 9 additional hours selected from:		**9**
CSCI 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
CSCI 8360	MACHINE LEARNING FOR TEXT	
CSCI 8476	PATTERN RECOGNITION	
AIML 8950	Graduate Internship in AI	
AIML 8970	Independent Study in AI	
ISQA 8720	APPLIED STATISTICAL MACHINE LEARNING	
MATH 8456	INTRODUCTION TO MACHINE LEARNING AND DATA MINING	
STAT 8730	ADVANCED STATISTICAL MACHINE LEARNING	

4. Computer Vision Concentration Requirements (12 credit hours)

Code	Title	Credits
Required Courses - complete all		**3**
CSCI 8300	IMAGE PROCESSING AND COMPUTER VISION	
Complete 9 additional hours selected from:		**9**
CSCI 8050	ALGORITHMIC GRAPH THEORY	

Code	Title	Credits
CSCI 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
CSCI 8476	PATTERN RECOGNITION	
CSCI 8590	FUNDAMENTALS OF DEEP LEARNING	
AIML 8950	Graduate Internship in AI	
AIML 8970	Independent Study in AI	
ISQA 8720	APPLIED STATISTICAL MACHINE LEARNING	
STAT 8730	ADVANCED STATISTICAL MACHINE LEARNING	

5. *Robotics Concentration Requirements (12 credit hours)*

Code	Title	Credits
Required Courses - complete all		**3**
CSCI 8460	FUNDAMENTALS OF ROBOTICS	
Complete 9 additional hours selected from:		**9**
CSCI 8050	ALGORITHMIC GRAPH THEORY	
CSCI 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
CSCI 8300	IMAGE PROCESSING AND COMPUTER VISION	
CSCI 8480	MULTI-AGENT SYSTEMS AND GAME THEORY	
CSCI 8486	ALGORITHMS FOR ROBOTICS	
AIML 8950	Graduate Internship in AI	
AIML 8970	Independent Study in AI	
STAT 8426	EXPLORATORY DATA VISUALIZATION AND QUANTIFICATION	

6. *Data Analytics Concentration Requirements (12 credit hours)*

Code	Title	Credits
Required Courses - complete all		**3**
CSCI 8590	FUNDAMENTALS OF DEEP LEARNING	
Complete 9 additional hours selected from:		**9**
ECON 8316	BUSINESS INTELLIGENCE AND REPORTING	
ECON 8310	BUSINESS FORECASTING	
ECON 8330	DATA ANALYSIS FROM SCRATCH	
CSCI 8080	DESIGN AND ANALYSIS OF ALGORITHMS	
CSCI 8350	DATA WAREHOUSING AND DATA MINING	
AIML 8950	Graduate Internship in AI	
AIML 8970	Independent Study in AI	
ISQA 8156	ADVANCED STATISTICAL METHODS FOR IS&T	
ISQA 8700	DATA MINING: THEORY AND PRACTICE	

Code	Title	Credits
STAT 8416	INTRODUCTION TO DATA SCIENCE	
STAT 8426	EXPLORATORY DATA VISUALIZATION AND QUANTIFICATION	

E. Sample Plans of Study

Students in Track A program will be enrolled with a plan of study when they enter into the program. Examples of the Plan of Study are shown below.

Full-time One Year Plan (Fall + Spring semesters + Summer session) - Example

MSAI Full-time One Year Plan - Example		
Fall semester		
Course #	Course Title	Credit hours
AIML 8456	**PRINCIPLES OF ARTIFICIAL INTELLIGENCE**	**3**
	Concentration Course 1	**3**
	Concentration Course 2	**3**
	Concentration Course 3	**3**
Spring semester		
Course #	Course Title	Credit hours
AIML 8110	**ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE**	**3**
AIML 8450	**ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING**	**3**
	Concentration Course 4	**3**
AIML 8990	**THESIS IN AI**	**3**

Summer session		
Course #	Course Title	Credit hours
	Elective Course	**3**
AIML 8990	**THESIS IN AI**	**3**

Full-time Three Semester Plan (No Summer session) - Example

MSAI Full-time Three Semester Plan - Example		
Fall semester		
Course #	Course Title	Credit hours
AIML 8456	**PRINCIPLES OF ARTIFICIAL INTELLIGENCE**	**3**
	Concentration Course 1	**3**
	Concentration Course 2	**3**
Spring semester		
Course #	Course Title	Credit hours
AIML 8110	**ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE**	**3**
AIML 8450	**ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING**	**3**
	Concentration Course 3	**3**
AIML 8990	**THESIS IN AI**	**3**
Fall semester		
Course #	Course Title	Credit hours
	Concentration Course 4	**3**

	Elective Course	**3**
AIML 8990	**THESIS IN AI**	**3**

Part-time Five Semester Plan - Example

MSAI-Track A Part-time Five Semester Plan - Example		
	Fall semester	
Course #	Course Title	Credit hours
AIML 8456	**PRINCIPLES OF ARTIFICIAL INTELLIGENCE**	**3**
	Concentration Course 1	**3**
	Spring semester	
Course #	Course Title	Credit hours
AIML 8110	**ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE**	**3**
	Concentration Course 2	**3**
	Fall semester	
Course #	Course Title	Credit hours
	Concentration Course 3	**3**
	Elective Course	**3**
	Spring semester	
Course #	Course Title	Credit hours
AIML 8450	**ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING**	**3**
AIML 8990	**THESIS IN AI**	**3**

Fall semester		
Course #	Course Title	Credit hours
	Concentration Course 4	**3**
AIML 8990	**THESIS IN AI**	**3**

F. Fast Track (BSAI+MSAI and BSCS+MSAI, Integrated) Programs

A Fast Track **BSAI+MSAI** or **BSCS+MSAI Integrated** MSAI program is available for highly motivated and qualified undergraduate students majoring in BSAI or BSCS desiring to pursue a MSAI degree in an accelerated time frame. With the Fast Track MSAI Program, students take up to 9 graduate credit hours of courses that satisfy both the MSAI and the BSAI or BSCS program requirements. Students will work with both undergraduate and graduate advisors to ensure the classes selected will count toward both programs.

To be admitted and enroll in this program students must have completed no less than 60 undergraduate hours and have a minimum undergraduate GPA of 3.0. Students need to complete the Fast Track Approval form and obtain all signatures and submit to the Office of Graduate Studies prior to first enrollment in a graduate course. A minimum cumulative GPA of 3.0 is required for graduate coursework to remain in good standing.

Students remain as undergraduates until they meet all the requirements for the undergraduate degree and are eligible for all rights and privileges granted undergraduate status including financial aid. Near the end of the undergraduate program, students must submit formal application to the graduate program and meet all admission requirements established for the MSAI program. The application fee will be waived if the applicant contacts the Office of Graduate Studies for a fee waiver code prior to submitting the MSAI application.

Students admitted and enrolled in the Fast Track **BSAI+MSAI** or **BSCS+MSAI** Integrated Program are possible to complete the MSAI program in two semesters or in one semester plus one summer session after they receive of the BSAI or BSCS degree. An example of the plan of study is shown below.

Fast Track (BSAI+MSAI and BSCS+MSAI Integrated) Program Plan - Example

MSAI Fast Track Full-time Three Semester Plan - Example		
Within the Four Year Undergraduate BSAI or BSCS Program		
Course #	Course Title	Credit hours

AIML 8456	**PRINCIPLES OF ARTIFICIAL INTELLIGENCE**	**3**
	Concentration Course 1 (Dual Level)	**3**
	Elective Course (Dual Level)	**3**
1st Semester of MSAI Program		
Course #	Course Title	Credit hours
AIML 8110	**ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE**	**3**
AIML 8450	**ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING**	**3**
	Concentration Course 2	**3**
AIML 8990	**THESIS IN AI**	**3**
Second Semester or Summer Session of MSAI Program		
Course #	Course Title	Credit hours
	Concentration Course 3	**3**
	Concentration Course 4	**3**
AIML 8990	**THESIS IN AI**	**3**

G. Administration of Track A

The Track A program has been designed to allow for the creation of new concentrations in the future, in addition to the initial offerings. The governance of this degree and its concentrations are managed by a MSAI Graduate Program Committee (GPC) whose responsibilities include:

- Deciding what courses are offered under the MSAI course designation
- Working with faculty and approving SLOs, and content more broadly, for all MSAI-designated courses.
- Managing the content for MSAI Core courses
- Deciding what concentrations to offer within the MSAI program
- Approving of special topics offerings
- Approving of internships and independent studies

- Report to CS department and the College Academic Committee
- Document workflows and processes, reviewing them annually, in consultation with the rest of the committee, to keep them up to date
- Handle all appeals and other management tasks
- Manage course and catalog update entry, if/when changes are made by the cognizant concentration committees
- Act as the primary point of contact for advising staff and the dean's office for the MSAI program.
- Coordinate program reviews, working with the concentration committees
- Schedule and conduct advisory board meetings, working with the concentration chairs for contact management
- Handle general education assessments for program-specific classes
- Student award/designation handling

The CS department, body of the whole, will maintain a veto privilege for decisions made by the program committee. The IS&T College Academic committee governs all courses and programs in the college, as specified in its charge in IS&T college governance documents.

IV. MS in AI Online Program at the UNL Campus – MSAI (Track B)

A. Admission Requirements

The online MS Program in AI follows and meets all the requirements of an MS program as specified by the Office of Graduate Studies (e.g., 30 credit hours, admission to Graduate College) for Option B, non-thesis master's degree. The program enhances the marketability of graduate students and provides a service to a segment of the community through advanced graduate education focusing on relevant and emerging topics of global interests. Applicants are encouraged to have a BS degree in Computer Science, Computer Engineering, Software Engineering, Data Science, or equivalent. However, students without a computing-related BS degree can join the program by first taking our two prerequisite courses, namely, *CSCE 801: Python Programming for AI* and *CSCE 802: Data Structures and Algorithms for Informatics*. These two courses will be offered asynchronously online.

To graduate, students must complete thirty (30) credit hours of graduate level courses (a sequence of 10 courses) beyond their bachelor's degrees. If needed, CSCE 801 and CSCE 802 should be taken as prerequisites to other courses, and they do not count towards the thirty (30) credit hours required for the degree. All courses will be delivered asynchronously online, with each course offering three (3) credit hours over an 8-week period. Most students are expected to complete the program within two calendar years by enrolling in two courses per semester. Some core courses (e.g., CSCE 878 and CSCE 879) will be offered more frequently to allow students enrolling in the program at different times to complete the program without delays. While we propose several elective courses, we will adjust offering cycles based on the student demands; those with higher demands will be offered more frequently. Below are sample schedules for students with and without prior computing background. Notice that students can take these courses in different sequences.

B. Sample Plans of Study

With prior computing background

Sample 2-year Plan (Starting in a Fall semester)	**5 semesters total**		
Semesters	**1st-8-week**	**2nd-8-week**	**Hours**
1st Fall	CSCE 810	CSCE 811	6
1st Spring	CSCE 820	CSCE 821	6
1st Summer	CSCE 822	CSCE 876	6
2nd Fall	CSCE 878	CSCE 879	6
2nd Spring	electives	electives	6
		TOTAL	30

Without prior computing background

Sample 2-year Plan (Starting in a Fall semester)	6 semesters total		
Semesters	**1st-8-week**	**2nd-8-week**	**Hours**
1st Fall (Bridge semester)	CSCE 801	CSCE 802	6
1st Spring	CSCE 820	CSCE 821	6
1st Summer	CSCE 822	CSCE 876	6
2nd Fall	CSCE 810	CSCE 811	6
2nd Spring	electives	electives	6
2nd Summer	CSCE 878	CSCE 879	6
		TOTAL	36

To implement and deliver this program, we will take advantage of our current faculty capacity. The School of Computing currently has 13 pre-tenured faculty who are on reduced teaching load. We anticipate 10 additional courses per year to be available in the next year or so which will not require additional costs or overloads. In addition, the startup costs for course development (estimated $60,000) and marketing (estimated $40,000) will be funded by the EVC Office in support of online program growth.

To ensure this program is accessible to students from various educational backgrounds, we are developing two bridge courses: CSCE 801, *Python Programming for AI*, and CSCE 802, *Data Structures and Algorithms for Informatics*. Although these courses are currently part of our undergraduate curriculum, we are refining and enhancing their content to align with graduate-level standards. CSCE 801 and CSCE 802 will be approved by the time the MS is implemented. The remaining courses are already offered in our graduate program, but they will require preparation for online delivery. CSCE 817, CSCE 820, and CSCE 822 have been taught as special topics courses but are in the queue and should be approved by the time the MS is implemented. We are also aware that the content in CSCE 880: Generative AI Applications, Ethics, and Research is critical to our proposed program. As such, we plan to make it a require course once it has gone through additional refinements. All online courses listed in the table below will be offered as 800 only sections, and thus graduate-only. Lab fees will only apply to courses with existing approvals; no new lab fees will be introduced.

C. Learning Outcomes

Students will gain the skills necessary to design, implement, and deploy real-world AI models and solutions across various industries. Graduates will also be able to work effectively in interdisciplinary teams to design holistic AI solutions. This outcome is achieved in our core and elective courses.

- Students will be capable of conducting independent research, report findings, and contributing to AI innovation. All courses will have project components that facilitate the achievement of this outcome.
- Students will be able to develop AI systems that are ethical, fair, and aligned with societal values; the outcome is got via CSCE 811, CSCE 878, CSCE 879, and CSCE 817.
- Students will be able to add to their knowledge and expertise in AI by staying current with new AI trends and developments, enabling them to evolve in their careers over

time. The project components in these courses facilitate self-exploration and self-study of new technologies, equipping them with skills to be life-long learners.

D. Program Structure

List specific required or elective courses in the major or degree. Please identify prerequisites for the required courses, if applicable. Add lines as necessary.			
Core AI: All 8 courses are required	Major/Degree Credit Hours	Prerequisites, if applicable	Lab fees, if applicable
CSCE 810: Information Retrieval	3	CSCE 802 or equivalent	
CSCE 811: Data Modeling for Systems Development	3	CSCE 802 or equivalent	
CSCE 820*: Introduction to Natural Language Processing	3	CSCE 802 or equivalent	
CSCE 821: Foundations of Constraint Processing	3	CSCE 802 or equivalent	$10
CSCE 822*: Introduction to Game Theory	3	CSCE 802 or equivalent	
CSCE 876: Introduction to Artificial Intelligence	3	CSCE 802 or equivalent	$40
CSCE 878: Introduction to Machine Learning	3	CSCE 802 or equivalent	$50
CSCE 879: Introduction to Deep Learning	3	CSCE 802 or equivalent	$50
Total	24 hours		
Technical elective courses: Choose two (2)	Major/Degree Credit Hours	Prerequisites, if applicable	
CSCE 817*: AI for Social Good	3	CSCE 802 or equivalent	
CSCE 838: Internet of Things	3	CSCE 802 or equivalent	$20
CSCE 873: Computer Vision	3	CSCE 802 or equivalent	$40
CSCE 874: Introduction to Data Mining	3	CSCE 802 or equivalent	
CSCE 880*: Generative AI Applications, Ethics, and Research	3	CSCE 802 or equivalent	
CSCE 915: Computational Linguistics	3	CSCE 802 or equivalent	
Total	6 hours		
* CSCE 817, CSCE 820, CSCE 822, and CSCE 880 have been offered as CSCE 892 Special Topics with these respective titles. New courses are in the approval process and are expected to be approved before implementation of the new MS.			

E. Administration of Track B

The Graduate Faculty Coordinator works with our Admission Committee (a team of 12 faculty members) to admit students into this program and oversees the curriculum, coordinates with graduate program staff on advising of elective courses, and analyzes success metrics such as graduation rate, graduation time, and course success rate of each course. Graduate program staff will co-advise with the Graduate Faculty Coordinator and will be responsible for support of recruitment efforts, tracking student's progress toward graduation, and helping the student complete graduation processes.

An essential part of the graduation process, as required by UNL, is the comprehensive examination. The comprehensive exam will consist of a portfolio to demonstrate achievement of the learning outcomes through coursework prepared by each student. During the semester when the student applies for graduation, the student will submit their portfolio to the Faculty Coordinator for evaluation as the Final Comprehensive Examination. This process is similar to the way we administer the comprehensive exam for course-only MS students in our MS in CS program. If the student meets all requirements, both the Faculty Coordinator and the Graduate Committee Chair will sign the comprehensive exam form and forward it to the Office of Graduate Studies.

Appendices

I. AI Jobs
II. Track A Course Description
III. Track B Course Description
IV. Letters of Support

Appendix I

Summary of Career Paths in AI

Career Path	Description	Median Annual Salary
AI Engineer	Build AI models from scratch and help product managers and stakeholders understand results.	$126,536
Natural Language Processing Engineer	Explore the connection between human language and computational systems; this includes working on projects like chatbots and virtual assistants.	$111,000
Computer Vision Engineer	Develop and work on projects and systems involving visual data.	$104,258
Robotics Engineer	Design, build and test robots or robotic systems.	$100,640
Data Mining and Analysis	Finding anomalies, patterns, etc. within large data sets to predict outcomes.	$93,044
Business Intelligence (BI) Developer	Analyze complex data sets to identify business and market trends	$92,283
Machine Learning Engineer	Using data to design, build and manage machine learning and software applications.	$145,296
Research Scientist	Expert in applied math, machine learning, deep learning, and computational stats. Expected to have an advanced degree in computer science or an advanced degree in a related field supported by experience.	$123,279

Appendix II

Course Descriptions for MSAI (Track A)

Core Courses			
Course Number	**Title and Description**	**Credit Hours**	**Remarks**
AIML 8456	**PRINCIPLES OF ARTIFICIAL INTELLIGENCE** An introduction to artificial intelligence. The course will cover topics such as machine problem-solving, uninformed and informed searching, propositional logic, first-order logic, approximate reasoning, temporal reasoning, planning under uncertainty, and machine learning. (Cross-listed with CSCI 4450). **Prerequisite(s):** CSCI 3320 with C- or better.	**3**	
AIML 8110	**ADVANCED TOPICS IN ARTIFICIAL INTELLIGENCE** An in-depth study of one or more topics selected from: search techniques, knowledge representation, knowledge programming, parallel processing in Artificial Intelligence, natural language processing, image processing, current and future directions, etc. May be repeated with different topics, with permission of adviser. **Prerequisite(s):** CSCI 4450 or CSCI 8456 or equivalent.	**3**	Cross-listed with CSCI 8110
AIML 8450	**ADVANCED TOPICS IN NATURAL LANGUAGE UNDERSTANDING** The course will provide in-depth study of the topics in natural language processing and understanding, such as syntax, lexical and computational semantics, natural language ambiguities and their disambiguation, logical form construction and inference. The course will survey state-of-the-art natural language processing toolkits and knowledge bases that boost the development of modern language processing and understanding applications. **Prerequisite(s):** CSCI 3320 OR CSCI 3660 OR CSCI 4450. Not open to non-degree graduate students.	**3**	Cross-listed with CSCI 8450
Elective Courses			
BIOI 8850	**SPECIAL TOPICS IN BIOINFORMATICS** This course is intended to provide a mechanism for offering instruction in subject areas that are not covered in other regularly scheduled courses. In general, courses offered under the BIOI 8850 designation will focus on evolving subject areas in bioinformatics. Prerequisite(s): Course prerequisites of a specific offering of BIOI 8850 will be determined by the supervising faculty member and will be identified in the course proposal. It is anticipated that permission of the faculty member teaching the course will be required.	**3**	
BMI 8400	**LINEAR ALGEBRA FOR ADVANCED COMPUTING AND AI**	**3**	

	Matrix Analysis and Linear Algebra are at the core of several important algorithms and techniques that are widely used in machine learning for data analytics, imaging informatics, and bioinformatics. The course will explore fundamental concepts of matrix analysis and linear algebra as they apply to machine learning, emphasizing applications over proofs. Students will have an opportunity to perform "pencil and paper" calculations as well as more sophisticated numerical computations using a programming language/statistical environment of their choice. Applications of linear algebra to machine learning in the context of imaging informatics and biomedicine will be covered in depth. Prerequisite(s): Proficiency in programming and knowledge of calculus are required. Familiarity with concepts from biology is beneficial but not required		
ECON 8316	**BUSINESS INTELLIGENCE AND REPORTING** The course will teach students to use state-of-the-art Business Intelligence (BI) software to generate reports and information from data. BI software is used to inform decision-making in industries from transportation to medicine, from marketing to government, and is facilitated by rapidly increasing access to data in all industries. Students will learn to employ best practices in visualization and verbal communication as they are trained to create valuable insights from data and convey those insights to stakeholders. Additionally, the course will aid students in preparing for certification in the use of state-of-the-art BI software. (Cross-listed with ECON 4350). **Prerequisite(s):** BSAD 2130 (or equivalent) OR Instructor Approval	**3**	
ECON 8310	**BUSINESS FORECASTING** The course will cover forecasting tools and applications applied to business settings. The first half of the course will cover traditional Econometric forecasting methods and the second half of the course will focus on predictive analytics models and machine learning. Time in the computer lab will be focused on teaching students how to implement the models discussed in lectures. (Cross-listed with BSAD 8080). **Prerequisite(s):** ECON 8320 (or equivalent programming experience) or permission of instructor. Not open to non-degree graduate students.	**3**	
ECON 8330	**DATA ANALYSIS FROM SCRATCH** Econometrics is routinely taught as an application class using a 'black box' like Stata or SAS to perform calculations. This class takes a different approach. Using the Python programming language, we build all estimators from scratch. Additionally, we introduce numerous non-parametric and simulation techniques. This approach to econometrics results in a stronger understanding of statistical assumptions and methods, a better understanding of when a method is appropriate, and stronger programming techniques. Furthermore, a deeper understanding of the underlying mechanics provides the student the ability to program custom procedures not already built into popular software packages. As part of the course, students will work with a community partner to answer a real question with data; MBA students should consult with their advisor about this course satisfying the project-focused capstone requirement.	**3**	

	Prerequisite(s): A multivariate or regression analysis course such as ECON 8300, ISQA 9130 or STAT 8436, and a programming class such as ECON 8320 or equivalent programming experience; or instructor approval. Not open to non-degree graduate students.		
CSCI 8050	**ALGORITHMIC GRAPH THEORY** The overall of the goal is to introduce advanced concepts in graph theory, graph modeling, and graph algorithms and how they can be used to solve a wide range of problems in various application domains. The course introduces students to several applied path algorithms, clustering and partitioning techniques, network flow algorithms, and weighted matching algorithms. Other advanced concepts associated with complex networks include node centralities in graphs and community detection approaches. The course will also introduce students to key classes of graphs with a particular focus on the main classes of Perfect Graphs and their applications in scheduling, chip design, mobile computing, and Biomedical Informatics. (Cross-listed with MATH 8050). Prerequisite(s)**:** CSCI 3320 or CSCI 8325 and MATH 4150 or MATH 8156 or permission of instructor. Not open to non-degree graduate students.	**3**	
CSCI 8080	**DESIGN AND ANALYSIS OF ALGORITHMS** The course provides student an understanding of advanced topics in algorithms. Main topics include growth of functions, asymptotic notation, recurrences, divide and conquer, dynamic programming, greedy algorithms, graph algorithms, and the theory of NP-Completeness. (Cross-listed with MATH 8080). Prerequisite(s)**:** CSCI 3320 or CSCI 8325 or equivalent. Not open to non-degree graduate students.	**3**	
CSCI 8300	**IMAGE PROCESSING AND COMPUTER VISION** This course introduces the computer system structures and programming methodologies for digital image processing and computer vision. The course will cover the mathematical models of digital image formation, image representation, image enhancement and image understanding. Techniques for edge detection, region growing, segmentation, two-dimensional and three-dimensional description of object shapes will be discussed. The course will concentrate on the study of knowledge-based approaches for computer interpretation and classification of natural and man-made scenes and objects. Prerequisite(s)**:** CSCI 1620 and CSCI 3320. Not open to non-degree graduate students.	**3**	
CSCI 8350	**DATA WAREHOUSING & DATA MINING** This course is an in-depth coverage of data warehousing and data mining. This course starts with coverage of data warehousing (an enabling technology for data mining) and covers the entire data mining process and various data mining functionalities in detail. Students will get a chance to practice knowledge learned in the course to complete term projects related to data warehousing and/or data mining. After taking this course, students should also be able to identify useful	**3**	

	resources to explore future developments in the area of data warehousing and data mining. Prerequisite(s): CSCI 4850 or CSCI 8856. Not open to non-degree graduate students.		
CSCI 8360	**MACHINE LEARNING FOR TEXT** This course focuses on the fundamental techniques for extraction of various insights from text data which is ubiquitous on the Web, social media sites, emails, news articles, digital libraries, and other sources. The course topics will include concepts and techniques used by search engines to crawl, index, and rank web pages on the Web, machine learning techniques for categorization of news articles into different categories, sentiment and opinion analysis of social media chats, text summarization, and information extraction. Prerequisite(s)**:** Not open to non-degree graduate students.	**3**	
CSCI 8460	**FUNDAMENTALS OF ROBOTICS** This course provides the core principles of robotics and the utilization of control and intelligence methodologies applied to the field of robotics. We will focus on the hands-on creation of software modules within the Robot Operating System (ROS) environment and explore how to integrate artificial intelligence techniques into a fully operational robot control system. Prerequisite(s): Prior completion of undergraduate coursework in CSCI 3320 Data Structures with C- or better AND any course equivalent to this course. Basic proficiency with Python or C++ programming is recommended.	**3**	
CSCI 8476	**PATTERN RECOGNITION** Structures and problems of pattern recognition. Mathematics model of statistical pattern recognition, multivariate probability, Bay's decision theory, maximum likelihood estimation, whitening transformations. Parametric and non-parametric techniques, linear discriminant function, gradient-descent procedure, clustering and unsupervised learning, and feature selection algorithms. (Cross-listed with CSCI 4470) Prerequisite(s)**:** CSCI 1620 with C- or better, and MATH 2050. Recommended: MATH 4740/8746 or STAT 3800/8805	**3**	
CSCI 8480	**MULTI-AGENT SYSTEMS AND GAME THEORY** This course covers advanced topics in the area of coordination of distributed agent-based systems with a focus on computational aspects of game theory. The main topics covered in this course include distributed constraint satisfaction, distributed constraint optimization, and competitive and cooperative game theory. (Cross-listed with MATH 8480) Prerequisite(s)**:** CSCI 4450 or CSCI 8456. Suggested background courses: CSCI 4480 or CSCI 8486; CSCI 8080. Not open to non-degree graduate students.	**3**	
CSCI 8486	**ALGORITHMS FOR ROBOTICS**	**3**	

	This course provides an introduction to software techniques and algorithms for autonomously controlling robots using software programs called controllers. Students will be taught how to program and use software controllers on simulated as well as physical robots. (Cross-listed with CSCI 4480). Prerequisite(s)**:** CSCI 3320 with C- or better. CSCI 4450/8456 is a recommended but not essential pre-requisite.		
CSCI 8590	**FUNDAMENTALS OF DEEP LEARNING** This course is an introduction to deep learning, a branch of machine learning concerned with the development and application of neural networks. Deep learning trains the machine to learn patterns that it is presented with rather than requiring the human operator to define the patterns that the machine should look for. Deep learning is behind many recent advances in artificial intelligence, such as face recognition, speech recognition and autonomous driving. This course will cover the foundations of deep learning, learning theory, basic/advanced neural networks and problem domains of many selected applications. Prerequisite(s)**:** CSCI 3320 or instructor permission	**3**	
CSCI 8666	**AUTOMATA, COMPUTABILITY, AND FORMAL LANGUAGES** This course presents a sampling of several important areas of theoretical computer science. Definition of formal models of computation and important properties of such models, including finite automata and Turing machines. Definition and important properties of formal grammars and their languages. Introduction to the formal theories of computability and complexity. (Cross-listed with CSCI 4660, MATH 4660, MATH 8666). Prerequisite(s): MATH 2030. Recommended: CSCI 3320/CSCI 8325	**3**	
AIML 8950	**GRADUATE INTERNSHIP IN AI** The purpose of this course is to provide students with opportunities to apply their academic studies of MSAI in environments such as those found in business, industry, and other non-academic organizations. The student interns will sharpen their academic focus and develop better understanding of non-academic application areas of artificial intelligence. Prerequisite(s)**:** Permission of the graduate program chairperson and a minimum grade point average of 3.0 (B), with at most one grade below B, but not lower than C+ for all MSAI graduate classes. Not open to non-degree graduate students.	**1-3**	
AIML 8970	**INDEPENDENT STUDY IN AI** Under this course number a graduate student may pursue studies in an area that is not normally available in the formal courses of MSAI program. The topics to be studied will be in a graduate area of MSAI to be determined by the instructor. Prerequisite(s)**:** Permission of the Graduate Program Committee. Not open to non-degree graduate students.	**3**	
CYBR 8080	**SPECIAL TOPICS IN INFORMATION ASSURANCE**	**1-6**	

	The course provides a format for exploring advanced research areas for graduate students in Information Assurance and related fields. Specific topics vary, in keeping with research interests of faculty and students. Examples include applied data mining, mobile security, web services and applications, vulnerability assessments, cloud computing security, and other issues in Information Assurance research. Prerequisite(s): Instructor Permission.		
CYBR 8410	**DISTRIBUTED SYSTEMS AND NETWORK SECURITY** The course aims at understanding the issues surrounding data security, integrity, confidentiality and availability in distributed systems. Further, we will discuss various network security issues, threats that exist and strategies to mitigate them. This course will cover topics in cryptography, public key infrastructure, authentication, hashing, digital signatures, ARP protection, IP and IPSEC, IP Tables, SSL/TLS, firewalls, etc. (Cross-listed with CSCI 8410) Prerequisite(s): IASC 8366 or equivalent(s); or instructor permission. Not open to non-degree graduate students	**3**	
ISQA 8016	**BUSINESS INTELLIGENCE** This course intends to provide graduate student in-depth exposure to the growing field of business intelligence. Business intelligence (BI) consists of the set of concepts and techniques used to analyze business data in support of decision-making and planning. BI spans a number of areas of management information systems, including Decision Support Systems (DSS), Enterprise Resource Planning (ERP), Data Warehousing, Knowledge Management, Customer Relationship Management, Data Mining, and others. Prerequisite(s): (ISQA 4150 or ISQA 8156) and ISQA 8040 and ISQA 8050. Not open to non-degree graduate students.	**3**	
ISQA 8030	**INFORMATION SYSTEMS AND ETHICS** This course gives you an introduction to organizations and the role that information and information systems play in supporting an organization's operations, decision-making processes, quality management, and strategic activities. The course provides an introduction to the management of information systems function, the strategic and regulatory issues of telecommunications, and ethical and legal issues related to information systems. Prerequisite(s): Admission into the MS in MIS program.	**3**	
ISQA 8156	**ADVANCED STATISTICAL METHODS FOR IS&T** This course emphasizes the application and interpretation of statistical methods including design of experiments, analysis of variance, multiple regression, and nonparametric procedures and the use of statistical computer packages. The intent is to develop quantitative abilities needed for quantitatively intensive jobs and for advanced study in management information systems, computer science and information technology. (Cross-listed with ISQA 4150) Prerequisite(s): CIST 2500 or equivalent (at least one course in statistics)	**3**	

ISQA 8700	**DATA MINING: THEORY AND PRACTICE** This course provides students theoretical issues as well as practical methods for conducting data mining process, including the implementation of a warehouse. After covering the essential concepts, issues, techniques to build an effective data warehouse, this course emphasizes the various techniques of data mining, such as association, classification, clustering and prediction for on-line analyses within the framework of data warehouse architectures. This course also promotes students to conduct a real-life data analyzing project in Big Data Era. Prerequisite(s): ISQA 8050 and ISQA 8310 and ISQA 8040, not open to non-degree graduate students.	**3**	
ISQA 8720	**APPLIED STATISTICAL MACHINE LEARNING** This course focuses on advanced techniques in the analysis and evaluation of data, using both supervised and unsupervised methods. It covers the main types of statistical learning models needed for complex data analytics problems, as well as aspects of model development and optimization. Topics include Linear and Non-Linear Regression Models, Classification, Resampling Methods, Model Selection and Regularization, Decision Trees, Model Boosting and Bagging, Support Vector Machines, and Clustering methods. This is an applied, hands-on course that will use a state-of-the-art statistical tool to implement the discussed approaches in assignments and a course project and focuses on the understanding and application of the concepts. Prerequisite(s): ISQA 8156 (B- grade or better) and the following topics: The equivalent of two classes of statistics and/or advanced mathematics and a minimum of one semester of applying R in courses and/or projects	**3**	
ISQA 8736	**DECISION SUPPORT SYSTEMS** This course examines a set of information systems which specifically support managerial decision makers: Decision Support Systems, Group Decision Support Systems, Executive Information Systems, Data Warehouses, Expert Systems, and Neural Networks. This course explores the development, implementation, and application of these systems, how these systems can be applied to current business problems, as well as how organizational issues impact the implementation and usage of these systems. (Cross-listed with ISQA 4730) Prerequisite(s): ISQA 8030 or equivalent.	**3**	
ISQA 8750	**STORYTELLING WITH DATA** This course provides an in-depth study of how to build a compelling story using data for business professionals to make winning arguments, it provides an overview of a number of technologies and research disciplines that enabled the power of data visualization. Data visualization is critical to managing large volumes of data and can be defined as the science (analytical) and art (design) of manipulating and presenting data for expression and cognitive recognition. Data visualization involves using data in a way that humans can clearly understand, supporting efforts by organizations to gain competitive advantage by changing operations, decision-making, and strategic initiatives.	**3**	

	Prerequisite(s): CSCI 1620 or equivalent. Admission into the UNO graduate program, basic web development or work experience with comparable grounding in programing, scripting concepts & technologies and permission by the instructor is needed.		
Capstone and Thesis			
AIML 8910	**MSAI CAPSTONE** The capstone course is to integrate coursework, knowledge, skills and experimental learning to enable the student to demonstrate a broad mastery of knowledge, skills, and techniques across the Master degree curriculum of AI for a promise of initial employability and further career advancement. The course is designed to be in a student-centered and student-directed manner which requires the command, analysis and synthesis of knowledge and skills. Students may apply their knowledge and skill to a project which serves as an instrument of evaluation. Students are encouraged to foster an interdisciplinary research and cultivate industry alliances and cooperation in this course. This capstone course should be taken only after students have completed at least 18 credit hour requirements for the major. Prerequisite(s): Master's degree of Computer Science with course-only option (program III). Not open to nondegree students.	**3**	
AIML 8960	**THESIS EQUIVALENT PROJECT IN AI** This course allows a graduate student to conduct a research project in Artificial Intelligence or a related area. The project is expected to place an emphasis on applied, implementations-based, or experimental research. The process for development and approval of the project must include appointment of supervisory committee (chaired by project adviser), a proposal approved by the supervisory committee, monitoring of the project by the supervisory committee, an oral examination over the completed written product conducted by the supervisory committee, and final approval by the supervisory committee. The approved written project will be submitted to the Office of Graduate Studies by the advertised deadlines. Prerequisite(s): Permission of Graduate Adviser. Not open to non-degree graduate students.	**6**	
AIML 8990	**THESIS IN AI** A research project, designed and executed under the supervision of the chair and approval by members of the graduate student's thesis advisory committee. In this project the student will develop and perfect a number of skills including the ability to design, conduct, analyze and report the results in writing (i.e., thesis) of an original, independent scientific investigation in Artificial Intelligence. Prerequisite(s): Permission of Graduate Adviser. Not open to non-degree graduate students.	**6**	

Appendix III

Course Description for MSAI (Track B)

Core Courses			
Course Number	**Title and Description**	**Credit Hours**	**Remarks**
CSCE 810	**Information Retrieval** Outline of the general information retrieval problem, functional overview of information retrieval. Deterministic models of information retrieval systems; conventional Boolean, fuzzy set theory, p-norm, and vector space models. Probabilistic models. Text analysis and automatic indexing. Automatic query formulation. System-user adaptation and learning mechanisms. Intelligent information retrieval. Retrieval evaluation. Review of new theories and future directions. Practical experience with a working experimental information retrieval system. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 811	**Data Modeling for Systems Development** Concepts of relational and object-oriented data modeling through the process of data model development including conceptual, logical and physical modeling. Techniques for identifying and creating relationships between discrete data members, reasoning about how data modeling and analysis are incorporated in system design and development, and specification paradigms for data models. Common tools and technologies for engineering systems and frameworks for integrating data. Design and analysis of algorithms and techniques for identification and exploration of data relationships, such as Bayesian probability and statistics, clustering, map-reduce, and web-based visualization. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 820	**Introduction to Natural Language Processing** Introduction to fundamental concepts and techniques in Natural Language Processing. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 820	**Introduction to Natural Language Processing** Introduction to fundamental concepts and techniques in Natural Language Processing. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 821	**Foundations of Constraint Processing** Constraint processing for articulating and solving industrial problems such as design, scheduling, and resource allocation. The foundations of constraint satisfaction, its basic mechanisms (e.g., search, backtracking, and consistency-checking algorithms), and constraint programming languages. New directions in the field, such as strategies for decomposition and for symmetry identification. **Prerequisite(s):** CSCE 802 or equivalent	**3**	Lab fee : $10
CSCE 822	**Introduction to Computational Game Theory**	**3**	

	Introduction to fundamental concepts and techniques in Game Theory **Prerequisite(s):** CSCE 802 or equivalent		
CSCE 876	**Introduction to Artificial Intelligence** Introduction to basic principles, techniques, and tools now being used in the area of machine intelligence. Languages for AI programming introduced with emphasis on LISP. Lecture topics include problem solving, search, game playing, knowledge representation, expert systems, and applications. **Prerequisite(s):** CSCE 802 or equivalent	**3**	Lab fee : $40
CSCE 878	**Introduction to Machine Learning** Introduction to the fundamentals and current trends in machine learning. Possible applications for game playing, text categorization, speech recognition, automatic system control, date mining, computational biology, and robotics. Theoretical and empirical analyses of decision trees, artificial neural networks, Bayesian classifiers, genetic algorithms, instance-based classifiers and reinforcement learning. **Prerequisite(s):** CSCE 802 or equivalent	**3**	Lab fee : $50
CSCE 879	**Introduction to Natural Language Processing** Fundamentals and current trends in deep learning. Backpropagation, activation functions, loss functions, choosing an optimizer, and regularization. Common architectures such as convolutional, autoencoders, and recurrent. Applications such as image analysis, text analysis, sequence analysis, and reinforcement learning. **Prerequisite(s):** CSCE 802 or equivalent	**3**	Lab fee : $50
Elective Courses			
CSCE 817	**AI for Social Good** Analyzes studies that address societal challenges through machine learning (ML) and, more broadly, artificial intelligence (AI). Focuses on selected research categorized under AI for Social Good (AI4SG), spanning areas such as agriculture, education, environmental sustainability, healthcare, social care, public safety, and transportation. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 838	**Internet of Things** Theoretical and practical insight into the Internet of Things (IoT). Basics of IoT, including devices and sensors, connectivity, cloud processing and storage, analytics and machine learning, security, business models as well as advanced topics such as localization, synchronization, connected vehicles, and applications of IoT. Includes a group project that provides hands-on interaction with IoT. **Prerequisite(s):** CSCE 802 or equivalent	**3**	Lab fee : $20
CSCE 873	**Computer Vision** High-level processing for image understanding and high-level vision. Data structures, algorithms, and modeling. Low-level representation, basic pattern-recognition and image-analysis techniques, segmentation, color, texture and motion analysis, and representation of 2-D and 3-D shape. Applications for content-based image retrieval, digital libraries, and interpretation of satellite imagery.	**3**	Lab fee : $40

	Prerequisite(s): CSCE 802 or equivalent		
CSCE 874	**Introduction to Data Mining** Data mining and knowledge discovery methods and their application to real-world problems. Algorithmic and systems issues. Statistical foundations, association discovery, classification, prediction, clustering, spatial data mining and advanced techniques. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 880	**Generative AI Applications, Ethics, and Research** Focuses on research and discussion to examine recent developments in and the implementations of Generative Artificial Intelligence (AI) systems. Covers ethical implications and potential broader impacts, while applying them to various domains, culminating in a class project. Specific concepts covered include core generative technologies ranging from variational autoencoders (VAEs), generative adversarial networks (GANs), and transformer-based models like large language models (LLMs) and diffusion image generation; key related concepts in terms of data considerations, model parameters and hyperparameters, finetuning and prompt engineering techniques; and practical use cases in terms of technology and industry through research paper reviews and case study discussions. **Prerequisite(s):** CSCE 802 or equivalent	**3**	
CSCE 915	**Introduction to Computational Linguistics** Covers the fundamentals of language modeling, parsing, machine translation, computational and statistical methods in comparative linguistics, laws of phonological change and language evolution, language families and script families, ancient scripts, computational methods for script comparison and the analysis of script evolution. **Prerequisite(s):** CSCE 802 or equivalent	**3**	

Appendix IV (Support Letters)

February 6, 2025

Dr. Mahadevan Subramaniam
Chair, Department of Computer Science
University of Nebraska at Omaha
6001 Dodge Street
Omaha, NE 68182

Dear Dr. Subramaniam,

On behalf of our Associations (Farm Credit Services of America, AgCountry Farm Credit Services, and Frontier Farm Credit), I am pleased to provide this letter of support for the proposed Master of Science in Artificial Intelligence (MSAI) degree program at the University of Nebraska at Omaha (UNO). We commend UNO for taking the initiative to develop an advanced AI-focused graduate program that will address the growing demand for AI expertise in academia, industry, and government sectors.

Artificial Intelligence is rapidly transforming the landscape of technology and industry, making it essential for universities to cultivate highly skilled AI professionals who can contribute to innovation and economic growth. Our Associations strongly believes that UNO's MSAI program will play a crucial role in developing a well-prepared AI workforce capable of tackling complex real-world challenges.

The MSAI curriculum, which includes core AI principles, machine learning, natural language processing, robotics, data analytics, and AI ethics, is well-aligned with the competencies required in today's workforce. Additionally, the program's interdisciplinary approach, industry collaborations, and hands-on learning opportunities will provide students with the necessary skills to excel in AI-driven careers.

At our Associations, we recognize the immense value of AI expertise in driving innovation and competitiveness. We anticipate that graduates from UNO's MSAI program will be well-equipped to contribute meaningfully to the AI ecosystem, whether in research, development, or applied AI roles. We also look forward to potential collaborations with UNO's faculty and students through internships, research partnerships, and knowledge-sharing initiatives.

We enthusiastically support the establishment of the MSAI program at UNO and believe it will be a valuable asset to the region, helping to position Nebraska as a hub for AI education and innovation. Please do not hesitate to reach out if we can further support this initiative.

Sincerely,

Russ Wagner
EVP, Chief Information Officer

Farm Credit Services of America | AgCountry Farm Credit Services | Frontier Farm Credit

Optum

Mid Revenue Cycle
Optum.com

31 January 2025

Dr. Mahadevan Subramaniam
Chair, Department of Computer Science
University of Nebraska at Omaha
6001 Dodge Street
Omaha, NE 68182

Dear Dr. Subramaniam,

I am delighted to offer this letter of support for the proposed **Master of Science in Artificial Intelligence (MSAI)** program at the **University of Nebraska at Omaha (UNO)**. We commend UNO for taking the initiative to establish a cutting-edge AI-focused graduate program that will address the increasing demand for AI expertise across academia, industry, and government sectors.

Artificial Intelligence is rapidly reshaping technology and industry, making it imperative for universities to produce highly skilled AI professionals who can drive innovation and economic progress. Optum and **UnitedHealth Group** strongly supports the development of UNO's MSAI program, recognizing its potential to equip students with the expertise needed to solve complex real-world challenges.

The MSAI curriculum, covering core AI principles, machine learning, natural language processing, robotics, data analytics, and AI ethics, aligns well with the skills and competencies required in today's workforce. Furthermore, the program's interdisciplinary approach, emphasis on industry collaboration, and hands-on learning opportunities will provide students with the practical experience necessary to thrive in AI-driven careers.

At Optum, we highly value AI expertise as a key driver of innovation and competitiveness. We anticipate that graduates from UNO's MSAI program will be well-prepared to make meaningful contributions to the AI field, whether in research, development, or applied AI roles. Additionally, we look forward to potential collaborations with UNO's faculty and students through internships, research partnerships, and knowledge-sharing initiatives.

We wholeheartedly support the establishment of the MSAI program at UNO and believe it will be a significant asset to the region, further positioning Nebraska as a hub for AI education and innovation. Please feel free to reach out if we can provide any additional support for this initiative.

Best regards,

Somya D. Mohanty

Dr. Somya D. Mohanty
Director of Artificial Intelligence, Clinical Language Intelligence,

Optum, UnitedHealth Group

Ph – 850-241-4743

Email – somya_mohanty@optum360.com

CQuence Health

January 31, 2025

Dr. Mahadevan Subramaniam
Chair, Department of Computer Science
University of Nebraska at Omaha
6001 Dodge Street
Omaha, NE 68182

Dear Dr. Subramaniam,

On behalf of CQuence Health, I am pleased to provide this letter of support for the proposed Master of Science in Artificial Intelligence (MSAI) degree program at the University of Nebraska at Omaha (UNO). We commend UNO for taking the initiative to develop an advanced AI-focused graduate program that will address the growing demand for AI expertise in academia, industry, and government sectors.

Artificial Intelligence is rapidly transforming the landscape of technology and industry, making it essential for universities to cultivate highly skilled AI professionals who can contribute to innovation and economic growth. CQuence Health strongly believes that UNO's MSAI program will play a crucial role in developing a well-prepared AI workforce capable of tackling complex real-world challenges.

The MSAI curriculum, which includes core AI principles, machine learning, natural language processing, robotics, data analytics, and AI ethics, is well-aligned with the competencies required in today's workforce. Additionally, the program's interdisciplinary approach, industry collaborations, and hands-on learning opportunities will provide students with the necessary skills to excel in AI-driven careers.

At CQuence Health we recognize the immense value of AI expertise in driving innovation and competitiveness. We anticipate that graduates from UNO's MSAI program will be well-equipped to contribute meaningfully to the AI ecosystem, whether in research, development, or applied AI roles. We also look forward to potential collaborations with UNO's faculty and students through internships, research partnerships, and knowledge-sharing initiatives.

We enthusiastically support the establishment of the MSAI program at UNO and believe it will be a valuable asset to the region, helping to position Nebraska as a hub for AI education and innovation. Please do not hesitate to reach out if we can further support this initiative.

Sincerely,

Michael S. Cassling
Executive Chairman

cc Chancellor Joanne Li, PhD

info@cquencehealth.com

13810 FNB Parkway | Suite 200
Omaha, NE 68154

866.808.7807

www.CQuenceHealth.com

BlueCross BlueShield Nebraska

Feb. 4, 2025

Dr. Mahadevan Subramaniam
Chair, Department of Computer Science
University of Nebraska at Omaha
6001 Dodge Street
Omaha, NE 68182

Dear Dr. Subramaniam,

On behalf of Blue Cross and Blue Shield of Nebraska (BCBSNE), I am pleased to provide this letter of support for the proposed Master of Science in Artificial Intelligence (MSAI) degree program at the University of Nebraska at Omaha (UNO). We commend UNO for taking the initiative to develop an advanced AI-focused graduate program that will address the growing demand for AI expertise in academia, industry, and government sectors.

Artificial Intelligence is rapidly transforming many industries, including health care. This makes it essential for universities to cultivate highly skilled AI professionals who can contribute to innovation, care delivery, quality and health outcomes. BCBSNE strongly believes that UNO's MSAI program will play a crucial role in developing a well-prepared AI workforce capable of tackling complex real-world challenges.

We believe a MSAI program at UNO will be a valuable asset to the region, helping to position Nebraska as a hub for AI education and innovation.

Sincerely,
Rama Kolli
Chief Information Officer
Blue Cross and Blue Shield of Nebraska
Rama.Kolli@NebraskaBlue.com

TABLE 1: PROJECTED EXPENSES												
CAMPUS AND NAME OF PROGRAM OR CENTER: Master of Science in Artificial Intelligence												
	(FY2026) Year 1		(FY2027) Year 2		(FY2028) Year 3		(FY2029) Year 4		(FY2030) Year 5		Total Cost	
Personnel	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost		
Faculty [1]			1	$166,400	1	$171,392	1	$176,534	1.25	$227,287		$741,613
Professional												$0
Graduate assistants [2]					1	$36,269	1	$36,939	2	$76,559		$149,766
Support staff [3]	0.02	$1,536	0.056	$4,430	0.096	$7,822	0.136	$11,413	0.192	$16,596		$41,797
Subtotal		$1,536		$170,830		$215,482		$224,886		$320,442		$933,176
Operating												
General Operating [4]		$4,000		$5,500		$5,500		$5,500		$5,875		$26,375
Equipment												$0
New or renovated space												$0
Library/Information Resources												$0
Other												$0
Subtotal		$4,000		$5,500		$5,500		$5,500		$5,875		$26,375
Total Expenses		$5,536.00		$176,329.82		$220,982.30		$230,385.93		$326,317.13		**$959,551.19**

[1] One full time tenure track faculty member starting in year 2 at $130,000, with 3% projected annual increases. An additional 0.25 FTE for faculty is anticipated from year 5 to account for graduate program chair departmental coordination release as the program approaches 50 students enrolled.

[2] One new graduate assistantship line per approximately every 25 student enrolled is including starting in year 3. Cost includes GA stipend, tuition remission for 15 credit hours at weighted IS&T graduate tuition rate, and health insurance benefits.

[3] Proportional salary and benefits for graduate advising staff, assuming an advising load of 250 students per graduate advisor, with 3% annual increases.

[4] Program marketing and advertising costs of $4000 annually. Annual professional development of $1500 per 1 FTE faculty is included.

TABLE 2: REVENUE SOURCES FOR PROJECTED EXPENSES - Master of Science in Artificial Intelligence

	FY 2025-26 Year 1	FY 2026-27 Year 2	FY 2027-28 Year 3	FY 2028-29 Year 4	FY 2029-30 Year 5	**Total**
Reallocation of Existing Funds						$0
Required New Public Funds						$0
1. State Funds						$0
2. Local Tax Funds (community colleges)						$0
Tuition and Fees [1]	$369,188	$533,925	$675,900	$826,275	$1,028,400	$3,433,688
Other Funding						$0
1						$0
2						$0
3						$0
Total Revenue	$369,188	$533,925	$675,900	$826,275	$1,028,400	$3,433,688