Reed, Katie

From: Smith, Randy
Sent: Friday, June 23, 2023 4:17 PM
To: Machiraju, Raghu
Cc: Andridge, Rebecca; Reed, Katie; Smith, Randy; Griffiths, Rob; Miriti, Maria; Orr, James; Duffy, Lisa; Quinzon-Bonello, Rosario; Tomasko, David; Howard, Ayanna
Subject: Proposal to establish a Graduate (3A) Certificate in Applied Artificial Intelligence

Raghu:

The proposal from the Department of Computer Science and Engineering to establish a Graduate (3A) Certificate in Applied Artificial Intelligence, was approved by the Council on Academic Affairs at its meeting on June 23, 2023. Thank you for attending the meeting to respond to questions/comments.

No additional level of internal approval is necessary. This action will be included in the Council's next Annual Activities Report to the University Senate (July 2023).

The Office of the University Registrar will work you with any implementation issues.

Please keep a copy of this message for your file on the proposal and I will do the same for the file in the Office of Academic Affairs.

If you have any questions please contact the Chair of the Council, Professor Rebecca Andridge (.1) or me.

Congratulations on this important new dimension of your academic programming.

Randy

THE OHIO STATE UNIVERSITY

W. Randy Smith, Ph.D.
Vice Provost for Academic Programs
Office of Academic Affairs
203 Bricker Hall, 190 North Oval Mall, Columbus, OH 43210
614-292-5881 Office
smith.70@osu.edu

From:	Carpenter, TJ
To:	Reed, Katie
Cc:	Quinzon-Bonello, Rosario; Miriti, Maria; Machiraju, Raghu
Subject:	Proposal to establish a 3A Graduate Certificate in Applied Artificial Intelligence
Date:	Monday, May 15, 2023 11:27:03 AM
Attachments:	image001.png Graduate_Certificate_Applied_Artificial_Intelligence_to_CAA.pdf

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Katie,

Please find a proposal to establish a 3A Graduate Certificate in Applied Artificial Intelligence in the Department of Computer Science and Engineering in the College of Engineering. It has been reviewed and approved by Graduate Council.

Please let me know if you need additional information to add this proposal to the agenda of the upcoming CAA meeting.

THE OHIO STATE UNIVERSITY
GRADUATE SCHOOL

TJ Carpenter, MS
Administrative Coordinator
The Ohio State University
Graduate School
250H University Hall, 230 North Oval Mall, Columbus, OH 43210
614-688-0230 Office
carpenter.1112@osu.edu / www.gradsch.osu.edu
Pronouns: He/Him/His

TO: Randy Smith, Vice Provost for Academic Programs

FROM: Graduate School Curriculum Services

DATE: May 15, 2023

RE: Proposal to establish a 3A Graduate Certificate in Applied Artificial Intelligence in the Department of Computer Science and Engineering in the College of Engineering

Proposal to establish a 3A Graduate Certificate in Applied Artificial Intelligence in the Department of Computer Science and Engineering in the College of Engineering

The proposal was received by the Graduate School on April 3, 2023. The combined GS/CAA subcommittee first reviewed the proposal on April 10, 2023, and recommended it for approval by the Graduate Council. The proposal was approved by the Graduate Council on May 9, 2023.

THE OHIO STATE UNIVERSITY

College of Engineering
Undergraduate Education and Student Services
122 Hitchcock Hall
2070 Neil Ave.
Columbus, OH 43210-1278
(614) 292-7931 Phone
(614) 292-93790 Fax
osu.edu

Memo

April 4, 2023

To: Maria Miriti, Interim Associate Dean, Graduate School
From: Rosie Quinzon-Bonello, Assistant Dean for Curriculum and Assessment

RE: 3A Graduate Certificate in Applied Artificial Intelligence

On March 31, 2023, the College of Engineering Committee for Academic Affairs (CCAA) discussed the proposal submitted by the Department of Computer Science and Engineering to establish a *3A Graduate Certificate in Applied Artificial Intelligence*.

This certificate will be the essential component of the Department of Computer Science and Engineering's (CSE) novel AI+X offerings. CSE has been in discussions with several entities, various Colleges, ODEE, and the Graduate School to create eventual stackable degrees that include an applied AI core and other topics (the Xs). This particular certificate will be accompanied by a complementary stackable *Certificate in Intelligent Medicine and Digital Health* submitted by BMI, which was recently approved by CAA.

CCAA voted unanimously to support this proposal.

Thank you,

THE OHIO STATE UNIVERSITY

Curriculum Proposal Checklist

Title of Program: 3A Graduate Certificate in Applied Artificial Intelligence

Effective term: Autumn 2023 **College:** Engineering

New/Establish: ✔ **Secondary Major Eligible:** ☐ **Academic Unit:** Computer Science and Engineering

Revise: ☐ **50% Revision:** ☐ **Mark Up:** ☐ **Program Contact:** Fosler-Lussier, Eric <fosler@cse.ohic

Terminate: ☐ **Suspend:** ☐ **Certificate Category*:** 3a - Graduate, Post-Bachelor Degre

Degree/Credential: Certificate

Program of Study : Certificate **Title:** Applied Artificial Intelligence

Code:

Program Focus*: Specialization

Credit hours to degree/credential: 12 **Is this a change to the current total?** ☐ Yes ✔ No

Program offered only online? ✔ Yes ☐ No **If yes, is there a signed MOU with ODEE?** ✔ Yes ☐ No

Campus(es) where offered: ✔ Columbus ☐ ATI ☐ Lima ☐ Mansfield ☐ Marion ☐ Newark

Rationale: The proposed Applied AI core will be the essential component of the Department of Computer Science and Engineering's (CSE) novel AI+X offerings. CSE has been in discussions with several entities, various Colleges, ODEE, and the Graduate School on campus to create eventual degrees that include an applied AI core and other topics (the Xs). This stackable certificate offering will be accompanied by a complementary stackable certificate in Intelligent Medicine and Digital Health submitted by BMI. For now, the two certificates will be offered independently starting AU23. Many of the courses in the proposed stackable certificate dedicated to applied AI are already on the books. The two remaining ones will be made permanent in coming semesters.

Student Curriculum Sheet Required: ✔

Four Year (or appropriate) Plan: ☐

Academic Unit Curriculum Committee approval date: 5/2/22

College Curriculum Committee approval date:

Graduate School Council approval date*:

Regional Campus approval date*:

Council on Academic Affairs approval date:

University Senate approval date*:

Board of Trustees approval date*:

ODHE approval date*:

* If applicable

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THE OHIO STATE UNIVERSITY

College of Engineering

Department of Computer Science and Engineering

395 Dreese Labs
2015 Neil Avenue
Columbus, OH 43210

614-292-5813 Phone
614-292-2911 Fax

cse.osu.edu

March 24, 2023

Dr. Maria Miriti
Associate Dean of the Graduate School
The Ohio State University

Dear Dr. Miriti,

Thank you to the members of the GS/CAA for their comments in response to our submitted proposal for a Graduate Certificate in. We have diligently worked to provide responses to the requested changes and additions. The changes have been incorporated throughout the proposal and include additions to the program overview, curriculum, and assessment. An attached document titled, “CSE’s Responses to Requested Revisions” provides a detailed list of changes.

We have included letters of support from the department’s Chair, the Chair of Graduate Studies, and a consent letter from Department of Biomedical Informatics. The latter letter is provided given the submission of a complementary certificate dedicated to Artificial Intelligence in Digital Health. Finally, the letters from the College are included.

We at Computer Science and Engineering (CSE) remain excited by what this program represents to the larger OSU student community and the broader community. Thank you.

Sincerely,

DocuSigned by:
Raghu Machiraju
3149FC823BD3438...

Raghu Machiraju, Ph.D.
Professor, Biomedical Informatics, Computer Science and Engineering, and Pathology
Associate Chair for Growth, Computer Science and Engineering
Co-PI, NSF ICICLE AI Institute, icicle.ai

CSE's Responses to Requested Revisions:

Dear Graduate School Colleagues:

Provided below are requested revisions to our proposal for a certificate in Applied Artificial Intelligence. We place the effected changes below each request in red colored text.

1. Attachments
    a. Please provide cover letters from the academic unit, verifying that the proposal has been approved at the department and college levels (e.g., Graduate Studies Committee Chair, Department Chair, College Curriculum Committee, and/or College Academic Dean).

    b. Please provide a letter of support from the College of Medicine.

    c. If there is a pathway for students to complete 50 – 100% of the courses as distance enhanced (DH, 75 – 100% online) or distance learning (DL, 100% online), then please provide an MOU with ODEE/OTDI to offer a distance program.

RESPONSE: All requested letters in items (a)-(c) are attached to the package in the order listed above.

2. Program Overview
    a. Please add to the introduction a brief description of the disciplinary purpose, significance, and rationale for offering a new graduate certificate focused on artificial intelligence (e.g., response to developments in the field and industry, address students' interests, etc.).
    RESPONSE: We added adequate amount of description that describes the disciplinary purpose, significance, and the rationale for offering our new certificate in Applied Artificial Intelligence. Please peruse the section titled "Program Overview."
    b. What is the intended mode of delivery of the program? Will the certificate be offered only online, only in person, or blended (50% or more online and in person)?
    RESPONSE: The program will be close to 80-90% and hence is blended albeit with predominantly online delivery. The table in the section "Detailing of New Curriculum" marks all the courses that will be delivered online. It should be noted that many classes (except one) will be delivered online.
    c. Who is the intended audience of the program? And what are the admission criteria?
    RESPONSE: The program will seek students with bachelor's degrees in any of the STEM disciplines (and not in CSE), or those with bachelor's degrees in other disciplines and two (2) years of professional experience in data science and AI/ML. Also, students who are other graduate programs (and not in CSE) at Ohio State will be eligible. Please peruse the section titled "Admission Criteria.
    d. What is the projected enrollment of the program?
        i. Will students enroll and matriculate through the program as a cohort or will it be self-paced?
        RESPONSE: The program is self-paced. Please peruse the section title "Delivery Attendance, and Class Size" for more details.
        ii. PDF p. 12, under Advising Sheets, indicates that students will choose the semesters during which they will take courses and that all five courses will be taken during a semester. Please clarify in the Program Overview and under the Advising Sheets section (a) the number of semesters students can enroll in to

complete the certificate, and (b) the minimum number of courses students will be required to complete (e.g., four).

RESPONSE: The changes were made in the Advising Sheets and the section titled "Advising Students".

e. In what way, if any, may the new certificate impact department resources such as staffing, budget, etc.?
RESPONSE: Existing staff and budgetary resources will fund the offerings.

3. Curriculum
   a. PDF p. 3, please add to the table information about the mode of delivery for each course such as P (In Person, 0 – 24% online), HY (Hybrid, 25 – 74% online), DH (Distance Enhanced, 75 – 99% online), and/or DL (Distance Learning, 100% online).
   RESPONSE: Delivery information was added for each course.

   b. PDF, bottom of p. 3, how will it be communicated to students that 9 of the required 12 credit hours must be associated exclusively with this certificate (and not another certificate or degree), and how will the program monitor this?
   RESPONSE: We added this information to advising sheets and it will be conveyed to the students during enrollment.

4. Assessment
   a. How will the program monitor and respond to students' feedback concerning their online experiences in the program?
   RESPONSE: Students will be asked to describe their online experience through an orientation and onboarding exercise and will hold town-halls at the end of every semester. These in-person exchanges will be supplemented by appropriate questions in periodic and exit surveys. The section titled "Learning Goals and Assessment Plan for all Learning Objectives."

5. Minor Corrections
   a. Consider updating the table of contents and moving the section with short syllabi to after the draft advising sheet, organizing the proposal as follows to support flow: Program Overview, Detailing of Curriculum, Learning Goals and Assessment Plan, Relationship with a Potential Future Degree, Advising Sheet, Short Syllabi, MOU with ODEE/OTDI.
   RESPONSE: All sections are rearranged as suggested.

      i. Please note, as the university considers if and how to implement stackable certificates, updated policies and guidelines may be forthcoming concerning how certificates may be stacked to meet degree requirements. Once developed and approved, the Graduate School will share the policies/guidelines with academic units. For this reason, please consider removing information on how the certificate will stack into a degree and address this information in a future proposal for stacking certificates into a degree.
      RESPONSE: The noted verbiage has been removed.

   b. PDF p. 16, edit for clarification the Advising Sheet statement, "… with 9 credit hours of required course work indicated below."
   RESPONSE: The statement in the Advising Sheet has been corrected to reflect actual required credits.

Closing

The Graduate School looks forward to receiving the revised proposal. Please submit it to Grad-SchoolCurriculum@osu.edu (cc: TJ Carpenter.1112 and Anika Anthony.171). Upon receipt of the proposal, GS/CAA will review it, and if satisfied, will move it forward to the Graduate Council for their review. Following Graduate Council review, it will move on to the Council on Academic Affairs for theirs.
RESPONSE: The department has forwarded all the material to the College (per their request) who will then forward to the Graduate School.

We in CSE are grateful to our colleagues in the College of Engineering, the Graduate School, and Office of Academic Affairs for all the support they have provided to our many initiatives in the academic programming space. Thank you very much.

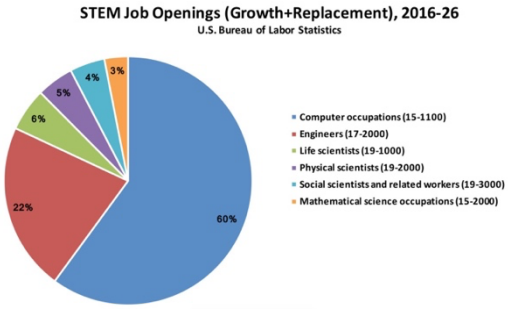
Sincerely,

CSE Chairs
Prof. Anish Arora, Eric Fosler-Lussier, and Raghu Machiraju

Table of Content

Certificate: Applied Artificial Intelligence

Program Overview



The technology of Artificial Intelligence (AI) and especially a branch of AI known as Machine Learning (ML), is being increasingly adopted, given its successful deployment for many day-to-day purposes. The demand for talent and workforce for those well-versed in the science and the mathematics of machine learning is high and those enrolled in computing, mathematics, and statistics are in great demand. The adjacent figure shows the growth of job openings in computer occupations in recent and coming years. Needless to say, but much of this growth is driven by the outside interest in AI and ML. Still, universities have not kept pace with the demand; the number of students with training in foundational AI will not be sufficient. More importantly, there is a dearth of talent that will impede the widespread use of ML and AI-at-large in many sectors including agriculture, business, conservation, engineering, medicine, and politics. Current programs in these disciplines are not geared to address the growing workforce needs.

In the same vein, student demand as evinced by surveys conducted by universities have strongly indicated the need of programs that facilitate the blended study of computing, AI/ML, and another discipline "X". It will also necessitate that the offered AI instruction be applied rather than foundational. This is the express purpose of this application namely to create a certificate dedicated to the teaching of Applied AI.

When paired with other domain-rich offerings (e.g., AI in Digital Health) such a blended learning experience will allow the enrolled student to not only understand the basics of the AI/ML technologies but will also inform the student on the challenges and requirements of deploying these novel technologies to various domains. Various departments and institutes have recognized this need. Thus, with the creation of this certificate in Applied AI, interested students now combine this offering with many other offerings including the recent AI in Digital Health certificate program.

Market Needs

JobsOhio, a public-private state agency has been a viable source of information on the growth of demand in the tech and information technology sectors in the state. The role of AI and data science as market drivers has also been identified by the agency. More importantly, it has pointedly noted that additional and new demand will arise from many sectors that are increasing dependent on information technology and AI/ML. Other formal and informal surveys conducted with help of OTDI have indicated a similar large and growing demand.

Type of Certificate

The certificate will be offered as a Stand-Alone Graduate Certificate (Certificate 3a).

Detailing of New Curriculum

The Applied AI Certificate program will include the following courses, namely:

Course Number	Course Title	Credit Hours	Required/Elective	Delivery
CSE 6521*	Artificial Intelligence	3	Required	DL
CSE 5YYY	Ethics in AI (to be developed)	3	Required	DL
CSE 6520*	Foundations of Applied Artificial Intelligence for Non-Majors	3	Elective[+]	DL
CSE 5914	Capstone Design: Knowledge-Based Systems	4	Elective	DH
CSE 5523	Machine Learning and Statistical Pattern Recognition	3	Elective	DL
CSE 5524	Computer Vision for Human-Computer Interaction	3	Elective	DL
CSE 5525	Foundations of Speech and Language Processing	3	Elective	DL
CSE 5526	Introduction to Neural Networks	3	Elective	DL
CSE 5422	High-Performance Deep/Machine Learning (in approval)	3	Elective	DL

1. For the last column titled delivery, we use the following notation: P (In Person, 0 – 24% online), HY (Hybrid, 25 – 74% online), DH (Distance Enhanced, 75 – 99% online), and/or DL (Distance Learning, 100% online).
2. [+]CSE 6520 should be taken by students who need background in programming, linear algebra, and probability theory prior to taking CSE 6521.
3. The courses marked with * are required, and the rest will be electives.

All courses are three credit hour semester courses except for the capstone design course CSE 5914 dedicated to Knowledge-Based Systems. The total number of credit hours required to obtain the certificate is 12. At least 9 credit hours of the required 12 credit hours must be associated exclusively with this certificate.

Learning Goals and Assessment Plan for all Learning Objectives

Students enrolled in the certificate program will learn both the fundamental methods and practical skills of AI. We build upon the learning outcomes of particular courses and using the assessment mechanisms within the courses to validate the skills. Courses are also regularly assessed through our department's accreditation mechanisms and through periodic (semester) and exit surveys, and course SEIs. Students will also be asked to describe their online experience through an orientation and onboarding exercise and will hold town-halls at the end of every semester. These in-person exchanges will be supplemented by appropriate questions in periodic and exit surveys.

More specifically, we expect the students to have:

1. **Knowledge of fundamental concepts of AI.** The following learning outcomes are associated with this learning goal:

A	Be familiar with current topics within AI
b	Be knowledgeable with the ethical issues arising from use of AI
c	Be knowledgeable with the use of AI in various applications

d	Be knowledgeable with the limits of AI

The students will gain a good understanding to the following four questions: (i) What is Artificial Intelligence? (ii). What are the advantages gained from the use of AI? (iii) What are the pitfalls and difficulties of deploying AI? (iv) What are the ethical issues that arise from the deployment of AI.

Assessment Plan. This learning objective will be reflected in exams and projects of courses: Artificial Intelligence (CSE 6521), Foundations of Applied Artificial Intelligence for Non-Majors (CSE 6520), Capstone Design: Knowledge-Based Systems (CSE 5914), Ethics in AI (CSE 5YYY).

2. **Mastery of cutting-edge techniques in AI.** The following learning outcomes are associated with this learning goal:

a	Be knowledgeable with the underlying mathematical foundations of AI
b	Be knowledgeable with representations and approaches in AI
c	Be knowledgeable with methods of statistical machine learning
d	Be knowledgeable with methods of computer vision
e	Be knowledgeable with methods of natural language processing

The students will gain a deeper exposure to the required data representations and essential methods that are necessary for the realization of AI methods on digital computers. They will be able to answer the following questions: (i) How does one organize given data for a particular problem? (ii) How does one choose a specific method? (iii) How does one evaluate the efficacy of AI methods?

Assessment Plan. This learning objective will be reflected in exams and projects of courses: Foundations of Applied Artificial Intelligence for Non-Majors (CSE 6520), Machine Learning and Statistical Pattern Recognition (CSE 5523), Computer Vision for Human-Computer Interaction (CSE 5524), Foundations of Speech and Language Processing (CSE 5525), Introduction to Neural Networks (CSE 5526), High-Performance Deep/Machine Learning (CSE 5422).

3. **Problem solving.** The following learning outcomes are associated with this learning goal:

a	Be competent to understand problem of significance, engage in systematic design, implement, and evaluate solutions
b	Demonstrate ability to explain the problem and solutions to audience with various background
c	Be competent to work in various teams with different people

With the practice of course projects, the students will be familiar with critical thinking that enable them to appropriate identify questions, design methodology to solve those questions and finish implementation, systematical evaluate and analysis the result of the design. They will also master both oral and written presentation to audience with various background. These skill sets enable them to fast adapt to industry or academia to pursue

greater achievement. Students will use examples and case studies from various domains to hone their problem-solving skills.

Assessment Plan. This learning objective will be reflected in the assignments and the projects in all selected courses and especially the capstone course.

4. **Translational competency.** The following learning outcomes are associated with this learning goal:

a	Demonstrate ability to deploy AI in different domains
b	Demonstrate ability to apply analytical and mathematical methods across domains to build predictive and interferential models
c	Demonstrate ability to scale methods for large data sizes
d	Demonstrate ability to realize methods on commonly available platforms
e	Be competent in the best practices of the student's specialization track

The students will gain a systematic understanding of different AI techniques enabling them to adopt this skillset to solving problems in different domains, such as commerce, engineering, and health sciences.

Assessment Plan. This learning objective will be reflected in the assignments and the projects in all selected courses including the capstone course.

The enrolled students will work closely with their advisor to make sure their learning goals will be clear from the beginning and satisfied at program completion. It will be important to work with the students to emphasize what they are expected to know, and the mindset, skills, and technical knowledge they should acquire from the certificate.

The group of students targeted for this certificate might present a unique set of challenges, either because they have been out of school for some time or because they might be working while pursuing the program or given the lack of familiarity with this program. The course assignments, projects and exams are three metrics to evaluate if students met the learning objectives. The objective of the certificate program is for each course to attain an average GPA of 2.8 or higher, and for the average weighted GPA (based on attendance) to be 3.0 or higher. To evaluate if the program objectives are met, faculty teaching the courses will be given a survey at the end the semester to evaluate several metrics, among which, if the students had an adequate background, if they managed to stay on track during the course, if the succeeded in the class and how they compared to the average OSU MS students. A similar survey will be sent to the students. The information collected will be used to enhance the quality of the program.

The objectives of the certificate program will also be assessed using additional direct and indirect measurements. In particular, the following data will be collected and analyzed to improve the quality of the program:

- Cumulative students' GPAs.

- Average GPA of students taking one course compared to the average GPA earned by the OSU students taking the same course.
- Number of applications.
- Quality of the applicant pool (cGPA and diversity).
- Acceptance rate.
- Completion rate.
- Time-to-Certificate.
- Exit survey at program completion.

Relationship with a Potential Future Program

This certificate was co-designed with the Intelligent Medicine and Digital Health Certificate. In the nine courses available for enrollment in the proposed CSE-offered Applied Artificial Intelligence certificate, there is no overlap with the proposed BMI-offered Intelligent Medicine and Digital Health certificate, which is outlined in the following table.

Course Number	Course Title	Credit Hours	Required /Elective
BMI 5780	Programming for Biomedical Informatics	3	Required
BMI 5551	Survey of AL/ML in Digital Health	3	Elective
BMI 5552	AI/ML application in medical imaging	3	Elective
BMI 5553	Predictive Analytics in Electronic Health Records	3	Elective
BMI 5554	Natural language processing in biomedical research	3	Elective
BMI 5750	Methods in Biomedical Informatics and Data Science	3	Elective
BMI 7235	Applications of Machine Learning for Bioinformatics	3	Elective

Impact on Departmental Resources

The department of Computer Science and Engineering (CSE) will support this certificate program as follows:

A. CSE will support faculty's teaching effort in the certificate, no additional faculty will be needed to meet the commitments imposed by the program. The department will offer at least four courses in a given year for students who desire to complete the program within a year.
B. Existing CSE advising and administrative staff will support this program. They will manage student applications, course registrations, and other program-related logistics.
C. CSE will anoint a faculty member who will lead this certificate program. This faculty member will serve as the primary student mentor and assist in course selection and career development questions among students.

Admission Criteria

This certificate is intended as a stand-alone, externally facing certificate. Applicants must apply with all necessary transcripts, a curriculum vitae or resume, and a statement of purpose. The faculty reviewing applications will seek students with bachelor's degrees in any of the STEM disciplines (and not in CSE), or those with bachelor's degrees in other disciplines and two (2) years of professional experience in data science and AI/ML. Students who are currently enrolled in a graduate program at Ohio State other than the one offered by the Department of

Computer Science and Engineering (CSE) will be eligible but will need to enroll separately in this program.

Delivery, Attendance, and Class Size

This certificate program is amenable to be offered fully online to allow for remote attendance as shown in section titled "Detailing of New Curriculum". The courses in this certificate will be delivered asynchronously, with recorded lectures available for participants who cannot attend during synchronous sessions due to time zone and work constraints. Although students can take these courses in a self-paced manner, majority of students are expected to matriculate in cohorts. The number of students enrolled in this program is not necessarily limited but will be so to manage its growth. The certificate program is designed to cater to both domestic as well as international students.

Advising Students

Each student will be asked to fill out a "Plan of Study" in the semester they enter the certificate program. In the plan of study, students will have to indicate which two elective courses they select and which semesters they intend to take all courses. At this stage, the students will only indicate which semester they intend to take these four courses. Students can change the plan of study throughout the program if the requirement of four courses is satisfied. When the Plan of Study is filled out for the first time, or changed afterwards, the student will be required to meet with the advisor to make sure their learning goals and expectations are clear.

The requirement that at least 50% of the required 12 credit hours must be associated exclusively with this certificate (and not another certificate or degree) will be communicated to the students, mentioned on the advising sheet, and tracked by the program manager.

Projected Enrollment and Duration

It is anticipated that the certificate will see an eventual enrollment of 60-100 students. Students can potentially complete the certificate in a single year.

Advising Sheet

AI In Digital Health: Applied AI Certificate

Name: _____ name. #:_____

Note: Twelve (12) credit hours needed for certificate completion, with 6 credit hours of required course work as described in course material and below. Students are encouraged to complete the program in two semesters and enroll in a minimum of four (4) courses. Two elective courses could be chosen depending on the students' interests. At least 9 credit hours of the required 12 credit hours must be associated exclusively with this certificate.

Required Courses:

Course Number	Course Title	Credit Hours	Year/Semester Taken
CSE 6521*	Artificial Intelligence	3	
CSE 5YYY*	Ethics in AI (to be developed)	3	

Elective Courses:

Course Number	Course Title	Credit Hours	Year/Semester Taken

Plan: Original ❑ Revised ❑

Reason for revision: _____
_____

Student Signature: _____ Date: _____

Advisor Name: _____ name. #:_____

Advisor Signature: _____ Date: _____

Short Syllabi

More details about the courses that will be offered are given in the syllabi listed in this section.

Course 1 – Artificial Intelligence

Course Title: Artificial Intelligence
Course Number: CSE 6521
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Survey of advanced concepts, techniques, and applications of artificial intelligence, including knowledge representation, learning, natural language understanding, and vision.
Course Objectives: The main objectives of the course can be summarized as follows:

Master advanced AI concepts, theories, and terminology
Master computational techniques in typical AI subareas
Master knowledge representation and reasoning methods in AI
Be exposed to current research topics in AI

Content Topic List: Below listed are the main topics covered in this course.

Search and problem formation
Uncertainty, probability theory, and utility theory
Bayesian Networks
Expectation-Maximization Algorithm
Markov Models
Markov Decision Processes and Reinforcement Learning
Decision Trees and Ensemble Learning
Perceptrons and Neural Networks
Clustering
Application Areas (Natural Language Processing, Vision)
AI, Ethics, and Bias
AI Pedagogy

Course 2 - Ethics in AI

Course Title: Fairness, Bias, and Ethics in AI
Course Number: CSE 5YYY [TBD]
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Science of fairness in machine learning, sources and measures of the unfairness arising from ML algorithms, and interventions to mitigate unfairness issues.
Course Objectives: The main objectives of the course can be summarized as follows:

Be competent in describing fairness and its relationship to machine learning
Be competent in implementing approaches to achieving fairness in machine learning
Be familiar with causal reasoning
Be familiar with impacts of fairness interventions
Be familiar with ethical issues in machine learning
Be exposed to applications of fairness in machine learning

Content Topic List: Below listed are the main topics covered in the course.

Sources of Unfairness in ML
Definitions of Fairness
Tensions Between Different Fairness Notions
Approaches to Achieving Fairness in ML
Strategic Fairness
Causality and Fairness
Long-Term Impact of Short-Term Fairness Interventions
Applications of Fairness in ML and Algorithmic Decision-Making: Lending, Criminal Justice, Labor Market, Natural Language Processing, Computer Vision, etc.
Views of Fairness from Other Communities
Other Ethical Issues in ML (e.g., privacy, robustness) and Their Relations with Fairness

Course 3 – AI for Non-Majors

Course Title: Foundations of Applied Artificial Intelligence for Non-Majors
Course Number: CSE 6520
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Introduction to computer programming, to problem solving techniques using computer programs, and to the mathematical foundations of Artificial Intelligence. Specifically geared towards graduate students from non-Computer Science backgrounds with examples drawn from Artificial Intelligence.

Course Objectives: The main objectives of the course can be summarized as follows:

Be competent with the usage of basic components of a high-level programming language (e.g., variables, types, flow control, functions)
Be competent with the usage of common data structures of a high-level programming language (e.g., lists, tuples, maps)

Be competent with the usage of libraries in a high-level programming language
Be familiar with some basic linear algebra concepts (e.g., PCA, eigenvalues, eigenvectors) and how to use them in a high-level programming language
Be familiar with fitting statistical models to data in a high-level programming language
Be familiar with basic plotting techniques in a high-level programming language
Be exposed to basic neural networks and their usage in a high-level programming language
Be exposed to basic data analytic experimental techniques and standards

Content Topic List: Below listed are the main topics covered in the course.

Basic concepts
Data structure basics
Arrays of multiple dimensions
Dataframes and Basic Plots
Linear Algebra Basics
Regression
Probabilistic modelling
Neural Network Basics
Project Discussion/Midterm

Course 4 - Capstone Design

Course Title: Capstone Design: Knowledge-based Systems
Course Number: CSE 5914
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Capstone design project; conceptual and technical design; theory and practice of knowledge-based systems; teamwork, written and oral communication skills.

Course Objectives: The main objectives of the course can be summarized as follows:

Master task-level analysis and problem-solving methods for configuration (design) problems
Be competent with methods for representing and reasoning with uncertain knowledge
Be familiar with the methods used natural language tools

Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints
Be competent in evaluating design alternatives
Be competent with software design and development practices and standards
Be familiar with researching and evaluating computing tools and practices for solving given problems
Be competent with deadline driven projects in a team setting
Be competent with issues of project management, such as teamwork, project scheduling, individual and group time management
Be competent with presenting work to a group of peers
Be familiar with presenting work to a range of audiences
Be competent with techniques for effective written communication for a range of purposes (user guides, design documentation, storyboards etc.)
Be familiar with analysing professional issues, including ethical, legal and security issues, related to computing projects
Master task-level analysis and problem-solving methods for classification problems

Content Topic List: Below listed are the main topics covered in the course.

Introduction and overview
Natural language processing tools
Configuration and design
Reasoning with uncertain knowledge
Cloud-based question answering architectures
Current trends: Information search systems in industry
Design meetings, teamwork
Presentations

Course 5 - Statistical Machine Learning

Course Title: Statistical Machine Learning and Pattern Recognition
Course Number: CSE 5523
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.

Course Description: Introduction to basic concepts of machine learning and statistical pattern recognition; techniques for classification, clustering and data representation and their theoretical analysis.

Course Objectives: The main objectives of the course can be summarized as follows:

Master basic techniques of machine learning, including linear methods, prototype-based methods, and kernel methods
Master the statistical framework of machine learning and basic concepts, such as Bayes optimal classifier
Be competent with theoretical analysis of complexity and other properties of statistical learning techniques
Be familiar with the broad spectrum of methods for classification, regression, and clustering, including boosting, spectral clustering, and other methods

Content Topic List: Below listed are the main topics covered in the course.

Basics of statistical pattern recognition
Probability and statistical inference
Bayes decision theory
Overview of techniques for regression and classification, parametric and non-parametric methods including prototype-based methods, linear and kernel methods
Analysis of statistical algorithms
Clustering
Spectral clustering
K-means algorithm
Gaussian mixture models and the EM algorithm
Empirical risk minimization and VC-theory
Generalization bounds
Dimensionality reduction
Principal Components Analysis and Multidimensional Scaling
Advanced topics in machine learning
Discussion of applications, e.g., speech, language, and vision

Course 6 - Computer Vision

Course Title: Computer Vision for Human-Computer Interaction
Course Number: CSE 5524
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Computer vision algorithms for use in human-computer interactive systems; image formation, image features, segmentation, shape analysis, object tracking, motion calculation, and applications.

Course Objectives: The main objectives of the course can be summarized as follows:

Master fundamental computer vision algorithms.
Be competent with computer vision application design and evaluation.

Be familiar with MATLAB programming environment.
Be exposed to original research and applications in computer vision.

Content Topic List: Below listed are the main topics covered in the course.

Introductory computer vision
Image formation
Noise removal
Edge detection
Pyramids
Region segmentation
2-D shape
Template matching
Motion
Tracking
3-D
Event analysis
Features
Stereo
Clustering
Applications
Motion capture
Current research

Course 7 - Speech and Language Processing

Course Title: Foundations of Speech and Language Processing
Course Number: CSE 5525
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.

Course Description: Fundamentals of natural language processing, automatic speech recognition and speech synthesis; lab projects concentrating on building systems to process written and/or spoken language.

Course Objectives: The main objectives of the course can be summarized as follows:

Master the fundamentals of symbolic methods in language processing tasks, such as natural language parsing.
Be competent with fundamental concepts for natural language processing and automatic speech recognition, such as "hidden Markov models".
Be competent with fundamental concepts in text-to-speech synthesis, such as concatenative synthesis and text analysis.
Be familiar with a finite state framework integrating for speech processing.
Be familiar with a toolkit for text classification, part-of-speech tagging and sentiment mining.
Be familiar with methods of constructing speech recognition and synthesis systems.
Be exposed to current speech and language processing research.
Be exposed to toolkits for speech recognition and speech synthesis.

Content Topic List: Below listed are the main topics covered in the course.

Course introduction, part-of-speech tagging
HMMs, expectation maximization and search
Parsing
Word senses
Language modelling
Text classification and opinion mining
Human hearing, acoustics, and phonetics
Finite state transducers and automatic speech recognition toolkits
Dynamic time warping and acoustic modelling
Text analysis and speech synthesis
Language processing in context (systems)
Quizzes and in-class assignments
Project presentations

Course 8 - Neural Networks

Course Title: Introduction to Neural Networks
Course Number: CSE 5526
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Survey of fundamental methods and techniques of neural networks; single- and multi-layer perceptrons; radial-basis function networks; support vector machines; recurrent networks; supervised and unsupervised learning

Course Objectives: The main objectives of the course can be summarized as follows:

Master basic neural network methods
Be competent with solving problems using neural network techniques
Be familiar with enough background about neural networks to take other specialty courses on neural networks

Content Topic List: Below listed are the main topics covered in the course.

Introduction and McCulloch-Pitts networks
Perceptrons
Regression and least mean square algorithm
Multilayer perceptrons
Radial-basis function networks
Support vector machines
Recurrent networks
Unsupervised learning and self-organization
Applications
Current research
Exam and discussion

Course 9 - High-Performance Machine Learning

Course Number: CSE 5422 (in process of approval)
Course Title: High-Performance Deep/Machine Learning
Number of Credits: 3
Prerequisites: Junior, senior, graduate standing, or permission of instructor.
Course Description: Discussion of popular methods deep neural networks (DNNs) and deep learning (DL) frameworks including Tensorflow, PyTorch, MXNet, Caffe, and Chainer; survey of

applications in image recognition, speech processing, textual analysis, medical imaging, materials science, and autonomous vehicular systems; discussion of scale-up and scale-out approaches.

Course Objectives: The main objectives of the course can be summarized as follows:

Master the principles of deep/machine learning
Master the implications of different ways of using high-performance computing (HPC) systems for scale-up and scale-out of deep/machine learning algorithms
Master the different methods of performing distributed deep/machine learning parallelism techniques (data, model, spatial, layer, hybrid etc.)
Be familiar with the architectural designs of past and present (state-of-the-art) high-performance computer systems
Be familiar with analyzing and solving AI problems using deep/machine learning algorithms
Be exposed to emerging trends in high-performance computing architectures for deep/machine learning

Content Topic List: Below listed are the main topics covered in the course.

Overview
Deep Learning Frameworks
Introduction to HPC Technologies
Overview of the state-of-the-art DL Models
Data Parallel DNN Training using HPC Environment
Model Parallel DNN Training using HPC Environments
Advanced Parallelization Strategies

MOU with OTDI

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THE OHIO STATE UNIVERSITY

College of Engineering
Department of Computer Science and Engineering
395 Dreese Laboratories
2015 Neil Avenue

Columbus, OH 43210-1277

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www.cse.osu.edu

March 24, 2023

Dr. Maria Miriti
Associate Dean of the Graduate School
The Ohio State University

Dear Dr. Miriti,

Please find attached a proposed Certificate Program in Applied Artificial Intelligence (AI). This new graduate certificate is designed as a part of a number of certificate programs in the educational space we deem X+AI. Targeted at either working professionals and those who are not trained in traditional computing sciences, the certificate emphasizes skills that can be immediately used in the workplace and at the same time is responsive to the existing and emerging needs of employers well beyond the engineering and scientific disciplines.

The technology of Artificial Intelligence (AI) and especially a branch of AI known as Machine Learning (ML) is being increasingly adopted, given its successful deployment for many day-to-day purposes. More importantly, there is a dearth of talent that is impeding the widespread use of ML and AI-at-large in many sectors including agriculture, business, conservation, engineering, medicine, and politics. Simultaneously, student demand indicates the need of programs that facilitate the blended study of computing, AI/ML and another discipline “X”. The primary purpose of this application is to create a certificate dedicated to the teaching of Applied AI. When paired with other domain-rich offerings (e.g., AI in Digital Health) this certificate will allow the enrolled student to not only understand the basics of the AI/ML technologies but will also inform the student on the challenges and requirements of deploying these novel technologies to various domains.

The proposed certificate consists of 12 credit hours of coursework, which can be completed in two semesters. At least 9 credit hours of the required 12 credit hours must be associated exclusively with this certificate. The deliberate design of our certificate is in direct response of workforce needs identified during our market research and builds on the strengths of existing faculty.

Thank you for your consideration.

With best regards,

DocuSign Envelope ID: DD827F27-398F-4A56-B58B-6C09021009FD

Anish K. Arora
Chair and Professor, Computer Science and Engineering
Faculty Director, 5G-OH Connectivity Center
The Ohio State University
www.cse.ohio-state.edu/~anish
and
Co-founder of The Samraksh Company

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395 Dreese Labs
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614-292-2911 Fax

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March 21, 2023

Dr. Maria Miriti
Associate Dean of the Graduate School
The Ohio State University

Dear Miriti:

On May 02, 2022, the Graduate Studies Committee at the Department of Computer Science and Engineering discussed the proposed Applied AI Certificate program and unanimously voted “YES” to support it.

Should you have any questions, please feel free to contact me at qin.34@osu.edu.

Sincerely,

DocuSigned by:
Feng Qin
FD9299D3A17E47E...

Feng Qin
Associate Professor
Chair of the Graduate Studies Committee
Department of Computer Science and Engineering
The Ohio State University

THE OHIO STATE UNIVERSITY

Daniel M. Clinchot, MD
College of Medicine

Vice Dean for Education
Associate Vice President for Health Sciences Education

260 Meiling Hall
370 West 9th Avenue
Columbus, OH 43210-1238

614-688-3104 Work
614-292-4499 Fax

Dan.Clinchot@osumc.edu

November 4, 2022

Dr. Maria Miriti
Associate Dean of the Graduate School
The Ohio State University

Dear Prof. Miriti:

The College of Medicine fully endorses the proposal for a new Certificate Program in Applied Artificial Intelligence prepared and submitted by the Department of Computer Science and Engineering. The proposed certificate program does not conflict with the programs offered by in our college and is complementary to our own certificate programs pertinent to AI in Digital Health. It is indeed the case that the curriculum for the proposed certificate program was designed in close collaboration with BMI faculty and we look forward to working with the Department of Computer Science and Engineering in making both offerings a success.

Sincerely,

Daniel M Clinchot, MD
Vice Dean for Education
Professor and Chair, Department of Biomedical Education and Anatomy
Harry C. and Mary Elizabeth Powelson Professor of Medicine
College of Medicine
The Ohio State University

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Memorandum of Understanding

Online Program

Between

College/Department: Engineering/Computer Science and Engineering

And

Office of Technology and Digital Innovation
The Ohio State University

Purpose

This Memorandum of Understanding (MOU) is entered into by and between the Office of Technology and Digital Innovation and the above College/Department to facilitate the launch of the online program outlined below.

Program name: Certificate in Applied Artificial Intelligence

Program level:

Graduate Professional

Approval type:

Certificate

Has this program been approved in the past? (e.g., on-ground approval)

No

If yes, please explain: N/A

Will the new approval replace or operate in conjunction with the existing approval?

No

Percentage of courses offered online:

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80-99%

If other, please explain: N/A

Anticipated date to begin recruiting and enrolling: Summer/Fall 2023

Will this program have a different fee structure from what would normally be assessed similar students at the university?

No

If yes, please explain: N/A

Total credit hours for program: Twelve (12)

Does this program have mandatory onsite training components on any Ohio State campus? (e.g., practicum, residency, or internship)

No

If yes, please explain: N/A

Does this program have any non-mandatory onsite training components on any Ohio State campus? (e.g., orientation)

Yes No

If yes, please explain: N/A

Recruitment and Enrollment

Estimated number of students (unduplicated count) enrolled per semester, beginning with the first semester in which you intend to enroll your first cohort:

	Summer	Autumn	Spring	Total
Year 1 AY___2023__		30	30	60
Year 2 AY_____		33	33	66

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Year 3 AY_____		35	35	75

College/Department Contacts

College Curricular Dean: Dr. David Tomasko

Department Chair: Dr. Anish Arora

Faculty/Program Director (*responsible for instructor and course coordination)*: Dr. Eric Fosler-Lussier

Primary Contact, if different from Faculty/Program Director:

College Fiscal Officer: Mr. Bobby Srivastava

College Marketing Director: Mr. Matt Schutte

Contact(s) for program-specific marketing and recruitment activities: TBD Executive Assistnant to Chair

Name, title, and email of all those who will be responsible for receiving and responding to OTDI-driven prospective student inquiries: Dr. Eric Fosler-Lussier

Contact for State Authorization compliance: Dr. Eric Fosler-Lussier

Additional college/contacts for this program: N/A

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Term of MOU

This MOU will begin effective April 2023 and will be discussed and reaffirmed every three years at the start of the next fiscal year on July 1, however continual dialogue will ensue to ensure the involved parties are evaluating the partnership. This MOU does not automatically renew. At the end of this term June 30th, 2026 a new MOU will be created. Should the online program end at any time, the DE budget model will remain in effect for three years from the end point of the online program in order for the budget model to self-adjust and close, given that the budget model operates on a one-year lag, two-year average from the start of the online program.

OTDI Responsibilities:

The Office of Technology and Digital Innovation (OTDI) entering into this agreement will partner with colleges to:

Program Administration

1. Consult and recommend best practices for program approval, course approval, student information labeling, and budget forecasting.
2. Partner with programs, where applicable, to submit data to the *U.S. News and World Report* for Best Online Programs Rankings Survey

Participate in Compliance Activities

1. Consult and recommend options as State Authorization related considerations arise
    a. Consult and support college understanding of rules and regulations
    b. Engage in prioritization strategy to support the unit's goals
    c. Communicate the program's authorization status to the college
2. Actively monitor regulations and participate in regional and national State Authorization networks to provide recommended best practices to seek and maintain required authorizations.

Partner to Build Online Courses Based on Best Practice

1. OTDI will collaborate with the college at least one semester prior to each course's first offering term on the curricular and technical solutions for online course design based on best practice by providing expertise on the following:

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   a. Elements of course format, rigor, and integrity that affect delivery mode, based on university policies (tracking attendance with at least one student activity each week, credit hour equivalency), federal policies, and accreditation standards
   b. Best practices for promoting and maintaining the academic integrity of the courses, including assignment design and technical solutions
   c. Course templates that provide students with consistent, clear navigation and online course expectations based on best practices
   d. Formats and platforms for course activities and materials that are supported by university technical requirements and optimal for distance delivery
   e. Evidence-based recommendations about teaching strategies in online courses
   f. Technical and instructional mechanisms that facilitate the program's assessment of student learning across courses

2. Provide instructional design consultation and production support for each course, including an initial semester-long (14-week) offering of support, tailored to the instructor's needs and any program requirements. OTDI will plan for staffing availability based on the course design schedule (see Appendix C: Course Design Schedule). This schedule will be confirmed with the Faculty/Program Director each semester and support for instructors/courses added to the schedule after confirmation is received, or for instructor changes, will be provided as OTDI's staffing allows.
3. Collaborate with the college to provide support for course revision with current instructors every three years following the initial instructional design support term.
4. Share expertise on accessibility best practices expected for courses of all modalities at Ohio State and provide referrals to local Accessibility Coordinator.
5. Provide professional learning opportunities for faculty/instructors/students through OTDI and in ongoing partnership with other campus units; promote these opportunities directly with program instructors.
6. Provide additional consultation to instructors associated with the program (as indicated in the attached course design schedule or updated by a program Faculty/Program Director or other contact), including:
   a. Opportunities for consultation from the instructional design team before, during, or after the first term when a course is taught following OTDI course design support
   b. Consultation and pathways for professional learning for additional instructors who begin teaching a course before the scheduled three-year revision support

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Conduct Marketing and Recruitment Activities to Drive Interest and Applications

1. The OTDI Marketing and Communiations Team is responsible for promoting Ohio State's portfolio of for-credit online degree and certificate programs. The OTDI marketing team will work with leaders from each program, as well as other internal and external stakeholders as necessary, to design a tailored marketing plan best suited to drive prospective-student inquiries to the program/college.
2. OTDI marketing services include:
    a. Market analysis to inform program demand, identify competitors, determine alumni outcomes, etc. These insights are best leveraged in the program-development stage.
    b. A presence on online.osu.edu that includes web development and copywriting (all programs)
    c. Inclusion in digital and non-digital portfolio-level marketing campaigns (all programs)
    d. Program-specific marketing tactics that may be leveraged include digital advertising, traditional advertising, written and visual storytelling, student journey mapping, and landing page development, among other strategies.

Note: Marketing will only be conducted in states/countries in which the program has been authorized.

Advance Student Support Offerings for Online Learners

1. Actively engage in discussions with campus stakeholders to improve and advance how Ohio State supports online learners
2. Research and provide colleges/units with data on national trends in distance education student support.

College/Department Responsibilities:

College/Department entering into this agreement will partner with OTDI to:

1. Engage with the OTDI Marketing and Communications Team to conduct market analysis to understand program viability and inform specific aspects of program development.

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Secure Approval

1. Secure approval from the following, where applicable:
    a. Department
    b. College
    c. Graduate School
    d. Council on Academic Affairs (CAA)
    e. University Senate
    f. Board of Trustees
    g. Department of Higher Education
    h. Accreditation Provider
2. Contact the Office of Fiscal Planning and Analysis university budget office and request a distance-education-specific fee table
    a. If applicable, differential fees must be approved by the Board of Trustees
3. Contact Student Financial Aid and Office of Student Academic Success to determine initial enrollment term
4. Meet program standards set forth by your accrediting body (if applicable) for alternative delivery modes

Program Administration

1. Submit applicable courses for online delivery and any course revisions to curriculum.osu.edu (after CAA approval of program)
2. Label students in the Student Information System with the Distance Education subplan (ONL)
   Please note: student fee assessment and college revenue rely on the ONL subplan accurately and consistently applied. The Distance Education Budget Model only applies to students labeled with the ONL subplan.
3. Collaborate with Admissions to create an application
4. Develop and maintain a website or webpage for the program that links to the application
5. Incur additional costs not covered by the Distance Education Budget Model, if applicable, associated with distance education programming (e.g., staff or funding to provide consistent support and services to students, faculty, and staff associated with online programs as provided to those for on-ground programs)

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6. Collaborate with OTDI marketing
    a. Work in tandem with OTDI marketing to design and execute strategic recruitment marketing tactics
        i. If applicable, partner with the OTDI marketing team to financially amplify existing marketing tactics
    b. Invest college resources to support marketing and communications. The college must allocate the appropriate resources in order to reach each program's enrollment goals. (See College Marketing Responsibilities, attached)
    c. Regularly share application and enrollment numbers to inform marketing strategy (In absence of connection to the enterprise academic instance of Salesforce Marketing Cloud CRM for program recruitment)
7. Identify a Faculty/Program Director or designee to meet with OTDI on a semester basis to confirm course design schedule, faculty/instructor participation, share information such as strategies and future plans, updates, and feedback regarding the program and OTDI support.

Participate in Compliance Activities

1. Collaborate with OTDI on State Authorization and state professional licensing board approvals for programs in a licensed field
    a. Identify a college/program liaison to work with the OTDI State Authorization team
    b. Upon request, provide program, instructor, and faculty information to the State Authorization team
    c. Provide required professional licensing board disclosures in writing to potential and enrolled students
    d. Communicate to prospective students regarding their eligibility to enroll in the program and seek federal financial aid based on the program's authorization status
    e. Notify OTDI of states/countries from which you would like to enroll students during initial State Authorization consultation and if changes arise
    f. Post a link to the Ohio State Online disclosures webpage (go.osu.edu/disclosures) on the program webpage maintained by the college

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g. Notify the State Authorization team and the appropriate college/program State Authorization liaison regarding any changes in physical presence activities outside Ohio, such as:
    i. Establishing a physical location for students to receive synchronous or asynchronous instruction
    ii. Establishing an administrative office or providing office space for staff
    iii. Conducting on-ground supervised field experiences such as clinicals, practicums, student teaching, or internships
    iv. Placing more than 10 students simultaneously at a single placement site (e.g., a hospital)
    v. Requiring students to meet in person for instructional purposes more than twice per semester
    vi. Carrying out field study or research at a field station
h. Faculty/program directors and instructors new to working with State Authorization are strongly encouraged to participate in OTDI distance education training
    i. "State Authorization 101" course available in BuckeyeLearn (Search for "State Authorization 101" in BuckeyeLearn)

Partner to Build Online Courses Based on Best Practice

1. Colleges/programs will collaborate with OTDI on curricular and technical solutions to design online courses based on best practice at least one semester in advance of first offering the program. OTDI will provide expertise as outlined in the "Partner to Build Online Courses Based on Best Practice" section of OTDI Responsibilities.
2. Provide administrative support to facilitate OTDI instructional design scheduling for each course in the program, based on the course design schedule below. To allow for adequate support staffing from OTDI, communicate assigned faculty/instructors and any changes to that schedule at least one semester before OTDI support would begin for each course. Schedule changes or new instructors made after that window will receive OTDI support as staffing allows.
3. Collaborate with OTDI to coordinate support for the revision of courses every three years after the initial OTDI course design support term, including naming assigned faculty/instructors at the time of scheduling revision support.

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4. Encourage faculty/instructors to participate in professional learning opportunities, including those offered through OTDI and other university partners such as the Michael V. Drake Institute for Teaching and Learning.
5. Provide updates to OTDI about course instructor changes that necessitate additional consultation support from OTDI (e.g., a new instructor beginning to teach an existing course before its three-year revision support).

Conduct Marketing and Recruitment Activities to Drive Interest and Applications

1. Identify a liaison(s) for program-specific marketing and recruitment activities. The liaison(s) will act as the point of contact with the OTDI Marketing and Communications Team and work with the faculty/program director and other college marketing professionals to gather information needed to execute strategic marketing tactics
2. Work with the OTDI marketing team to establish an appropriate marketing budget to help support program application and enrollment goals
3. Provide detailed outline of prospective-student lead nurturing process that includes the following (template available upon request):
    a. Name, title, and email of all those who will be responsible for receiving and responding to OTDI-driven prospective student inquiries
    b. Marketing and communication touchpoints
    c. Response timing
4. Create and maintain program-specific information on the college/department's website. The OTDI marketing team can provide guidance and suggestions for complementary content
5. Execute marketing tactics that are complementary to – and not in competition with – OTDI lead-generation tactics. Marketing tactics include:
    a. Recruitment activities (e.g., webinars)
    b. Content marketing (e.g., storytelling, social media, gated content, info sessions)
    c. Email marketing (e.g., personalized journeys, list acquisition, awareness generation through newsletters, etc.)
    d. Partnering with OTDI, where applicable, to submit data to the *U.S. News and World Report* for Best Online Programs Rankings Survey.

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Provide Student Support to Online Learners

1. Collaborate with relevant student support services (Disability Services, Writing Center, Libraries, Military and Veterans Services, etc.) to ensure resources available across campus are made known to learners and that student needs are met.
2. Ensure compliance with applicable university policy expected for courses of all modalities at Ohio State, including provisions of the Digital Accessibility Policy to include obtaining approved Accommodation-Based Exceptions, when needed. College/departments will be responsible for the costs associated with these accommodations as well as accommodations for use of tools outside Ohio State's enterprise-supported academic toolset.
3. Ensure technology support for any learning technology tools you or your college/department requires for use in your program of that are outside of the supported university toolset and 24/7 help desk support (Toolset Services: teaching.resources.osu.edu/toolsets). College/department provides the ongoing administrative and end-user support for these platforms.

Major Deliverables

High level deliverables that will be provided by OTDI:

- OTDI will design courses in partnership with faculty/instructors at least one if not two semesters prior to program launch
- OTDI will conduct all State Authorization and licensing board research prior to the program application for admission opening
- OTDI will provide marketing support for programs within Ohio State's academic online program portfolio.

Pricing and Billing

OTDI support for online program growth is funded through the Distance Education Budget Model created by the University Senate Fiscal subcommittee to incentivize colleges to develop online programs. Beyond the OTDI services listed in this MOU, the Budget Model also supports the enterprise academic learning technology toolset at Ohio State such as Canvas, Zoom, Proctorio, and ExamSoft, open courses, and the ability to provide program data. The Committee on Academic Technology; Student-Athlete Advisory Committee; Council on Distance Education Libraries, and Information Technology; Council on Academic Affairs; and Council on Enrollment and Student Progress provide governance to OTDI work and services. Please review and complete all appendices and attachments.

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Appendix A: State Authorization

	Yes/No
Does this program potentially lead to a professional license or certification?	**Yes**
Will this program be marketed as leading to a professional license or certification?	**No**
Is professional licensure or certification a prerequisite for enrollment in the program?	**No**

For this program, does your college plan to do any of the following outside of Ohio:

	Yes/No
Enroll students located outside Ohio?	**Yes**
Establish a physical location for students to receive synchronous or asynchronous instruction?	**No**
Establish an administrative office or provide office space outside of Ohio for staff?	**No**
Conduct on-ground supervised field experiences such as clinicals, practicums, student teaching or internships?	**No**
Place more than 10 students simultaneously at a single placement site (e.g., a hospital)?	**No**
Require students to meet in person for instructional purposes more than twice per semester for a total of more than six hours?	**No**
Carry out field study or research at a field station?	**No**

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Appendix B: Course Support Schedule

In order for OTDI to plan appropriately and provide every instructor with the highest quality support possible, we request specific information regarding courses that comprise a program's curriculum. This information is outlined in the table below, with required columns denoted with an asterisk. The course design schedule will be confirmed with the Faculty/Program Director each semester.

Note: the information in the first row of the table is included only to provide an example of how the information should be formatted.

Course Code and Name	Current Delivery Mode(s)	Instructor	Anticipated Course Design Term	First Offering Term
CSE 6521 - Artificial Intelligence	In person	TBD	Summer 2023	Fall 2023
CSE 5YYY - Ethics in AI	To be offered yet	TBD	Summer 2023	Fall 2023
CSE 6520 - Foundations of Applied Artificial Intelligence for Non-Majors	In person	TBD	Summer 2023	Fall 2023
CSE 5914 - Capstone Design: Knowledge-Based Systems	In person	TBD	Fall 2023	Spring 2024
CSE 5523 - Machine Learning and Statistical Pattern Recognition	In person	TBD	Summer 2023	Fall 2023
CSE 5524 - Computer Vision for Human-Computer Interaction	In person	TBD	Fall 2023	Spring 2026
CSE 5525 - Foundations of Speech and Language Processing	In person	TBD	Fall 2023	Spring 2024
CSE 5526 - Introduction to Neural Networks	In person	TBD	Fall 2023	Spring 2024
CSE 5422- High-Performance Deep/Machine Learning	Not offered yet	TBD	Spring 2024	Summer 2024

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Signatories

By signing this MOU, all groups agree to be active partners and to abide by this agreement:

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Department Chair	DocuSigned by: E7F92D72F2F8454...	Date: 04/25/2023
College Fiscal Officer	DocuSigned by: Bobby P. Srivastava 59EEBEEC7A8E404...	Date: 04/26/2023
College Marketing Director	DocuSigned by: Robert Mick 061370163A71455...	Date: 04/26/2023
Curricular Dean	DocuSigned by: David Lane Tomasko 3B8D0B6B2DEC453...	Date: 04/27/2023
Chief Digital Learning Officer	DocuSigned by: Robert Peter Griffiths B8CDF1EF93BA469...	Date 04/27/2023

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Anish Kumar Arora arora.9@osu.edu Professor and Chair, Computer Sc & Engg The Ohio State University Security Level: Email, Account Authentication (None), Login with SSO	DocuSigned by:  E7F92D72F2F8454... Signature Adoption: Uploaded Signature Image Using IP Address: 128.146.189.123	Sent: 4/11/2023 3:11:04 PM Viewed: 4/11/2023 5:32:34 PM Signed: 4/25/2023 7:00:44 PM
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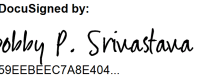
Bobby P. Srivastava srivastava.85@osu.edu Chief Administrative Officer Security Level: Email, Account Authentication (None)	DocuSigned by:  59EEBEEC7A8E404... Signature Adoption: Pre-selected Style Using IP Address: 24.208.232.76	Sent: 4/25/2023 7:00:47 PM Viewed: 4/26/2023 4:08:46 PM Signed: 4/26/2023 4:08:59 PM
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Robert Mick mick.15@osu.edu Director MGEL and MEM The Ohio State University Security Level: Email, Account Authentication (None)	DocuSigned by:  061370163A71455... Signature Adoption: Pre-selected Style Using IP Address: 216.186.196.16	Sent: 4/26/2023 4:09:01 PM Viewed: 4/26/2023 4:27:17 PM Signed: 4/26/2023 4:29:15 PM
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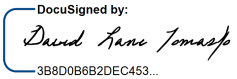
David Lane Tomasko tomasko.1@osu.edu The Ohio State University Security Level: Email, Account Authentication (None)	DocuSigned by:  3B8D0B6B2DEC453... Signature Adoption: Pre-selected Style Using IP Address: 162.194.218.31	Sent: 4/26/2023 4:29:17 PM Viewed: 4/27/2023 6:40:39 AM Signed: 4/27/2023 6:43:04 AM
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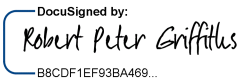
Robert Peter Griffiths griffiths.44@osu.edu The Ohio State University Security Level: Email, Account Authentication (None)	DocuSigned by:  B8CDF1EF93BA469... Signature Adoption: Pre-selected Style Using IP Address: 65.185.56.19	Sent: 4/27/2023 6:43:06 AM Viewed: 4/27/2023 7:45:37 AM Signed: 4/27/2023 7:47:22 AM
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Gail Martineau martineau.18@osu.edu The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 4/27/2023 7:47:27 AM Viewed: 4/27/2023 7:50:30 AM
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Completed	Security Checked	4/27/2023 7:47:29 AM

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