

Proposal for New Undergraduate or Graduate Minor

CREATION OF:

1. Undergraduate Minor Graduate Minor

2. Name of the proposed minor: Minor in Applied Artificial Intelligence

3. Primary College: LAS Secondary College: All others except Vet Med

4. Involved Department(s): Numerous (e.g., Computer Science, Mechanical Engineering, Philosophy and Religious Studies)

5. Name and email address of Administrator, Academic Unit or group originating the proposal:
Name: Jon Perkins (jperkins@iastate.edu) /Arne Hallam (ahallam@iastate.edu)

6. General description of the minor:
Applications of AI are permeating nearly every aspect of society, from healthcare diagnostics, financial analysis, and transportation optimization to enhancing educational methodologies, driving innovations in entertainment, and shaping more efficient and personalized customer experiences. The Applied AI minor is available to all undergraduate students at Iowa State University. It provides foundational knowledge on the use of AI using low-code or no-code tools available to a wide range of users. A useful analogy is that of being able to drive a car versus produce it or perform work under the hood. The minor also helps students understand the ethical, social, cultural, and economic implications of increased use of AI.

7. Rationale for creation of this minor:
Iowa State University has identified AI as an important growth area in our economy. The Applied AI minor is open to any undergraduate student studying at Iowa State University with the goal of enabling them to work with AI-enabled systems. The courses and curricula in these programs are designed to foster AI literacy and emphasize the ethical considerations that accompany the evolving landscape of artificial intelligence. The Applied AI minor will provide students with the requisite background for jobs where AI tools are applied.

8. Objectives of the proposed minor including the student learning outcomes and how the learning outcomes will be assessed:
There are two required 200 level courses:

AI 201X: Introduction to Applied AI

Catalog-level description: Broad introduction to AI, focusing on its applications and impact across different fields and industries. Provides an overview of AI concepts, terminology, and real-world examples, allowing students to understand how AI is transforming various domains. Basic introduction of societal implications, ethical considerations, and potential challenges associated with AI. Opportunities to collaborate and use AI to address real-world challenges.

Course objectives

- Understand the fundamental concepts, techniques, and applications of artificial intelligence and their importance in various domains.
- Understand the ethical considerations and societal impacts of AI.
- Gain familiarity using (popular) no-code or low-code AI tools and platforms for building AI models spanning different modalities (e.g., text, image, video, audio, and others).
- Develop the ability to analyze and preprocess data for AI tasks (without coding).
- Develop practical skills in using no-code or low-code AI platforms through hands-on exercises and projects. Apply AI techniques to real-world problems and scenarios using no-code or low-code tools.
- Implement critical thinking and problem-solving abilities in the context of AI applications, including the ability to interpret and evaluate AI outputs.

AI 202X: Ethical Design, Use, and Impact of AI

Catalog-level description:

Real-world examples of ethical challenges posed by artificial intelligence (AI) technologies. How artificial intelligence affects users, the public, and society, domestically and globally. Responsibilities of AI designers, as well as public and private institutions, to those affected. Course is open to students from any major.

Course objectives

- Understand responsible AI design practices and ethical considerations in AI development, decision-making, and deployment.
- Reflect on personal, professional, and institutional ethical choices and responsibilities associated with design and use of AI.
- Examine the social, cultural, and global impacts of AI.
- Explore legal and regulatory frameworks for AI.
- Discuss emerging ethical issues in AI.

There are no prerequisites for either course. In addition to these two required courses, students will complete three electives from an approved list. These courses may be in the student's major or a different one. We are currently collecting information on available courses and discussing potential future offerings with departments.

Given that the minor has no capstone course or common upper division course, the learning outcomes as listed will be assessed in individual courses approved for the minor through various class related activities such as homework, quizzes, examinations, class presentations and projects, and papers. The curriculum committee for the minor will work with instructors teaching elective courses in the minor to ensure that each course meets a number of these objectives. The two required courses meet all these objectives in some way or another and so it is not necessary to create tracks from among the upper division courses to ensure they are all covered in the set of elective courses chosen. Some students will exceed expected levels of competency on some of the objectives, other students on different ones.

The learning outcomes are as follows.

- Suggest appropriate AI tools to solve AI problems
- Use no-code, low code, or coding dependent AI tools to set up and solve AI problems
- Preprocess data from a field (or fields) of interest to apply AI tools
- Evaluate the output of AI applications in terms of
 - How well the method chosen fits the problem addressed
 - How well the output provides answers to the questions posed
 - The implications of the output, not only on the agents directly addressed in the problem, but on other “external” agents, and society in general
- Describe the current legal and regulatory environment in AI, both domestically and globally, and discuss how this framework does or does not encourage innovation while protecting individual rights, particularly those of the most vulnerable.
- Identify the ethical challenges arising in a particular application of AI to individuals and those closely tied to them, to firms, other public and private institutions, communities (geographic and otherwise), and to society, now and in the future.

9. Relationship of the minor to other programs at Iowa State University:

The Computer Science Department has a graduate program in AI in computer science and also will propose a minor in AI in computer science.

10. Relationship of the minor to the strategic plans of the university, of the college, and of department or program:

One of the statements of aspiration in Iowa State University’s current strategic plan is “to be the most student-centric leading research university.” A success factor related to this statement is “students participate in high-impact practices.” Another of the statements of aspiration is “to be the

university that creates opportunities and forges new frontiers.” A success factor related to this statement is “innovation in curriculum.”

11. Comparison of the proposed minor with similar programs at other Regent’s institutions:

The University of Iowa has a certificate program in artificial intelligence, modeling and simulation (AIMS) that is housed in their Department of Mechanical Engineering (<https://me.engineering.uiowa.edu/undergraduate/artificial-intelligence-modeling-and-simulation-aims-certificate-programs>). It requires 18 semester hours of credit. The required courses include ME 4111 (“Scientific Computing and Machine Learning”) (3 sh), ME 4150 (“Artificial Intelligence in Engineering”) (3 sh), and a capstone design project on an approved AIMS topic in either ME 4086 (“Mechanical Engineering Design Project”) (3 sh) or ME 4098 (“Individual Investigations Mechanical Engineering”) (3 sh). For their three electives, students may choose from a list of 9 courses ranging from ME 4110 (“Computer Aided Engineering”) (3 sh) to ME 5300 (“Uncertainty Quantification and Design Optimization”) (3 sh).

Currently, the University of Northern Iowa does not have any programs in AI.

12. Program requirements and procedures, including:

- a. prerequisites for prospective students;

Undergraduate enrollment at Iowa State University

- b. application and selection process;

Complete university form for addition of minor

- c. language requirements (if applicable)

None

- d. courses presently available for credit toward the program;

As noted above, we are currently collecting information on available courses and discussing potential future offerings with departments. Courses currently identified as available for credit include (but are not limited to) the following:

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| COM S 472: Principles of Artificial Intelligence |
| COMST 330: Computer Mediated Communication |
| ECON 383X: Economics of Innovation |
| EDUC 454: Emerging Topics in Educational Technology – Introduction to AI in Education |
| ENGL 222X: Artificial Intelligence and Writing |
| JL MC 474: Communication Technology and Social Change |

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| MATH 422X: Mathematical Principles of Data Science |
| PHIL 343: Philosophy of Technology |
| PSYCH 350: Human Factors in Technology |

- e. Proposed new courses or modifications of existing courses;
See above for descriptions of the two required courses.
 - f. Advising of students;
Will be handled by existing advisors in primary major and members of the steering/advisory committee.

Once the minor is approved, it will be administered by a multidisciplinary, multi-college steering committee. See the governance document for details.
13. General description of the resources currently available and future resource needs, in terms of:
- a. Faculty members;
Initially, courses will be taught by current faculty. Colleges and departments will also be hiring in this area in the future. [There is a current search in the Department of English]
 - b. Computers, laboratories, and other facilities;
Existing facilities associated with existing courses
 - c. Library facilities (journals, documents, etc.) in the proposed area;
Existing facilities associated with existing courses
 - d. Supplies, field work, student recruitment, etc.
Existing facilities associated with existing resources
14. Describe the needs for new resources and/or reallocated resources. Attach to the program proposal memos from the department chair(s), the college dean(s), and other appropriate persons, agreeing to the allocation of new resources and/or the reallocation of resources.
No additional resources needed at this time.
15. Attach to the program proposal letters of support, recommendations, and statements, when appropriate, from programs and departments at ISU which are associated with the proposed program or have an interest in the proposed program. Letters of support from external stakeholders may also be included.

College of Agriculture and Life Sciences: The College of Agriculture and Life Sciences is supportive of the proposed minor. Overall, departments were enthusiastic and supportive of the proposal as it would complement and align nicely with their own courses.

Ivy College of Business: The Ivy College of Business is supportive of the Minor in Applied Artificial Intelligence. Applications of AI are relevant to all business disciplines and the minor will certainly provide our students with valuable additional credentials. Given the college's strong focus in business

analytics and information systems, we will certainly be able to contribute to the minor's elective coursework.

College of Design: The College of Design supports the Minor in Applied Artificial Intelligence, recognizing its immense potential in applications related to art, architecture, design, and planning fields. We are committed to encouraging and advising our students to integrate this crucial credential into their degree programs, emphasizing the transformative impact it can have on their education and future careers. In alignment with our current technology-focused coursework in specific areas, and the introduction of upcoming degree programs, we envision numerous opportunities to incorporate relevant courses that seamlessly align with the objectives of this new minor. We are excited about the prospect of further enriching our academic offerings and preparing our students for the challenges and opportunities of a rapidly evolving technological landscape.

College of Engineering: College faculty active in the AI area have engaged in the development of the proposal and courses. The college is supportive of the proposed minor. The course proposals were also shared with the college curriculum committee and no concerns were raised.

College of Human Sciences: The College of Human Sciences is supportive of the proposed undergraduate minor in Applied Artificial Intelligence (AI). Training in the application of AI is critical for students preparing to work in areas impacting the everyday lives of individuals, families, and communities (e.g., education, health and wellness, entrepreneurship, sustainability, data science, and policy making).

College of Liberal Arts and Sciences: Faculty members in the College of Liberal Arts and Sciences have been heavily involved in the development of the minor in Applied AI. We have polled departments to identify faculty and courses that are relevant to the proposed courses and minor. These faculty have provided input on both the courses and the minor. Computer Science, Statistics and English are teaching courses related to AI that do not overlap with but will complement and in some cases add to the minor. English is currently teaching a course, ENGL 222X: AI and Writing that will likely be an elective for the proposed minor in Applied AI. Statistics teaches courses that cover some aspects of machine learning, but none have machine learning or AI in the title. They may be appropriate for electives. Computer Science is providing a separate statement as they teach some upper division courses in machine learning and AI. They will be proposing a minor in AI (not Applied AI) suitable for students with a computer science, mathematics, statistics or engineering background. Some courses in each minor may be applicable to the other minor depending on student interest.

Department of Computer Science: The Department of Computer Science is very supportive of the Applied AI minor proposal. We believe that having an Applied AI minor available to the entire university is a great initiative, and it will be a significant recruiting tool for all majors at Iowa State University. The inclusion of a dedicated course on the ethical aspects of AI distinguishes this Applied AI minor. There is some overlap in the course material for AI 201 and that of our introductory programming classes Com S 127, 227 and 228. Some very basic preliminary concepts covered in Com S 472 and 474 may also be covered in AI 201. The department is not concerned about this overlap, as 201 will deliver the material in a manner that is accessible to a broader audience. The Department of Computer Science has also proposed an undergraduate minor in AI (not Applied AI) suitable for students with a computer science, mathematics, statistics or engineering background. Some courses in each minor may be applicable to the other minor depending on student interest.

16. If the new program is interdisciplinary, a governance document should be created and submitted to the Associate Provost for Academic Programs. Indicate here that it has been completed.

Governance document has been completed.

Iowa State University
Applied AI Minor: Governance Document

I. Mission Statement

Applications of AI are permeating nearly every aspect of society, from healthcare diagnostics, financial analysis, and transportation optimization to enhancing educational methodologies, driving innovations in entertainment, and shaping more efficient and personalized customer experiences. The Applied AI minor is intended for students studying at Iowa State University with the goal of enabling them to work with AI-enabled systems. The courses and curricula in these programs are designed to foster AI literacy and emphasize the ethical considerations that accompany the evolving landscape of artificial intelligence. The Applied AI minor will provide students with the requisite background that would enable them to take jobs where AI tools are applied.

II. Applied AI Curriculum Committee and their Normal Responsibilities

An Applied AI Curriculum Committee (AAICC) shall be appointed consisting of at least eight faculty members as follows:

1. Six members, one member each from the College of Liberal Arts and Sciences, the College of Engineering, the College of Business, the College of Agriculture and Life Sciences, the College of Design, and the College of Human Sciences, shall be appointed in consultation with Deans of the respective colleges.
2. The instructor/course coordinator for two required courses: Introduction to Applied AI, and AI Ethics.
3. The Applied AI Curriculum Committee will be explicitly responsible for the undergraduate minor in Applied AI and the undergraduate certificate in Applied AI. As other programs are developed the composition of the committee may change.
4. The College of Liberal Arts and Sciences will be responsible for the management of the interdisciplinary undergraduate Applied AI minor and will be referred to as the “Managing College” in this document. The managing college can be changed through the process of changing this governance document.
5. The Dean of the managing college, in consultation with other college deans and/or administrators, will appoint one or more non-voting members to the committee that will serve as liaison with AI-related centers or institutes at ISU.
6. The Dean of the managing college, in consultation with other college deans and/or administrators, will appoint a chair of the Applied AI Curriculum Committee from among the members of the committee.

In appointing the Applied AI Curriculum Committee, it is advisable for the six college representatives to have (a) staggered, three-year overlapping terms, and (b) overlap or close collaboration with members of curriculum committees in departments with significant teaching roles in the program. Terms can be renewed once.

The Applied AI Curriculum Committee will normally initiate changes to the Applied AI programs and their governance. Faculty from interested departments and programs as well as the Computing Curriculum Coordination Committee (CCCC) may also propose suggested changes in the program and their governance to the

committee.

Curricular changes. The Applied AI Curriculum Committee will discuss and vote on all proposals for curricular change. All curricular change votes to the program shall require a quorum, consisting of a simple majority of voting members. The Applied AI Curriculum Committee will keep the Computing Curriculum Coordination Committee (CCCC) apprised of all proposed changes. CCCC will ensure that appropriate curriculum committees (of other undergraduate colleges) and other appropriate individuals are engaged in the discussion. Changes approved by the CCCC will then be forwarded to the LAS curriculum committee for further discussion and approval as the curriculum committee of the managing college.

III. Unusual Circumstances

In the event of unusual circumstances not adequately covered by this document the curriculum committee chair shall refer matters to CCCC and the Dean of the Managing College for consultation with other college deans and/or administrators as appropriate for the issue at hand.

IV. Changes in the Governance Document

Any voting member of the Applied AI Curriculum Committee, any voting member of the CCCC, or any chair of a department with significant teaching responsibilities in the program may submit a written proposal for a change in the governance document. Such proposals will be discussed in the Applied AI Curriculum Committee meeting. Changes in the governance document that are approved by the Applied AI Curriculum Committee will be forwarded to CCCC and the Dean of the Managing College for discussion (with other colleges) and final approval.

In the event that this governance document is in conflict with a university policy and/or the ISU faculty handbook, the latter would prevail.

