

**Agendum  
Oakland University  
Board of Trustees Formal Session  
June 26, 2023**

**BACHELOR OF SCIENCE IN ARTIFICIAL INTELLIGENCE  
A Recommendation**

1. **Division and Department:** Academic Affairs, School of Engineering and Computer Science, Department of Computer Science and Engineering.
2. **Introduction:** Oakland University proposes a new degree undergraduate program in Artificial Intelligence, specifically the Bachelor of Science in Artificial Intelligence within the Department of Computer Science and Engineering (CSE), in the School of Engineering and Computer Science (SECS).

A CSE committee composed by faculty experts in Artificial Intelligence (AI) was formed to examine existing AI programs throughout the State of Michigan and the nation, understand labor market data, obtain information regarding the accreditation process (ABET), survey student interest, receive feedback from our community partners including the CSE advisory board, and compose a formal proposal for the Bachelor of Science in AI program (Attachment A).

According to a recent update of the Worldwide Semiannual Cognitive Artificial Intelligence Systems Spending Guide from International Data Corporation (IDC), the AI software platforms market grew rapidly during 2019 and it will continue to speed up significantly in the next 10 years. Thus, IDC forecasts that the overall market will reach \$13.4 billion in revenue in 2024 with a CAGR (Compound Annual Growth Rate) of 31.1% over the entire period.

Given the increasing demands and the high industrial investments in this area, it is necessary that the university gets involved and trains skilled leaders in the creation of Artificial Intelligence systems that will function seamlessly alongside humans. In this context, this program is aimed at achieving this goal, as well as addressing the emerging needs of this market.

The program will include a strong foundation in AI core concepts. A total of 18 credits in the core AI curriculum will cover different areas including the Ethics of AI, machine learning, Natural Language Processing, deep learning and beyond. In addition, 44 credits will be applied to deepening understanding through the study of Professional Subjects and 6 credits in Professional Electives. A further 12 credits in one of the following concentrations will be required: (1) Edge AI and IoT, (2) Embedded AI, (3) Human- Centered AI, Augmented/Virtual Reality and Robotics, (4) Machine Learning,

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(5) Smart Manufacturing and Industry 4.0, (6) Artificial Intelligence for IT Operations (AIOps), (7) AI for Cyber Security and Trustworthy AI, (8) Augmented/Virtual Reality and (9) Ethics of AI. Lastly, 20 credits in Math and Science and 26 credits of university required general areas of study will be added to this curriculum as well as a Capstone project, for a total of 128 credits.

**Need for the Bachelor of Science in Artificial Intelligence degree at Oakland University**

There has been rapid growth in the hiring of professors who work in AI as well as in co-related areas that either exploit AI techniques or provide some of the basic science used to develop those techniques. Another important motivation for this new degree is from a research perspective. Given the number of active researchers in AI, there will be opportunities for professors and students to perform research together on the many AI research projects being pursued in Southeast Michigan, as well as the possibility for BS students to continue onto an MS program in computer science or related domains. The BS in AI will develop students strong in the core AI discipline and its applications by integrating AI research and educational activities, increasing collaboration within Oakland University and establishing an exciting AI learning environment for students in collaboration with the strong support of industry partners.

Unlike other existing programs in the state of Michigan, the interdisciplinary nature of the proposed program aims to serve automotive industry, manufacturing, IT, financial, healthcare, law enforcement and defense organizations through its specialized concentrations Edge AI and IoT; Embedded AI; Human-Centered AI and Robotics; Machine Learning; Smart Manufacturing and Industry 4.0; AI for Cyber Security & Trustworthy AI; and Augmented/Virtual Reality.

**3. Previous Board Action:** None.

**4. Budget Implications:** The primary source of funding new resources will be undergraduate tuition once the program is accepting students. Therefore, by year two, the program will generate net revenues. The School of Engineering and Computer Science is currently working with University Advancement to identify community donors for additional program funding. Tuition revenue for 90 AI students will reach a steady state in year 4. Salary expenses include full-time faculty, and graduate assistants.

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Operating expenses include supplies and services, travel, library, and marketing. The proforma budget is included as Attachment B.

**5. Educational Implications:** The proposed program will develop a complete set of curricula in AI that significantly improves the AI teaching and research capabilities at Oakland University. The newly developed courses will be available and beneficial to students majoring in Computer Science (CS) and Information Technology (IT) thus enhancing the existing BS programs offered by the School of Engineering and Computer Science.

**6. Personnel Implications:** The program would require one (1) new Assistant Professor and two (2) new Teaching Assistants (TAs) per year over the period of the first 5 years, however these resources will be needed gradually, and they are proportional with the growth of the program. One Assistant Professor will be hired in the 2nd year of the program.

**7. University Reviews/Approvals:** This proposal for Bachelor of Science in Artificial Intelligence degree program was reviewed and approved by the School of Engineering and Computer Science Assembly, the OU University Committee on Undergraduate Instruction (UCUI), the OU Senate, and the Executive Vice President for Academic Affairs and Provost.

**8. Recommendation:**

WHEREAS, the Bachelor of Science in Artificial Intelligence degree program is consistent with the objectives contained in Oakland University's Institutional Priorities; and

WHEREAS, the Bachelor of Science in Artificial Intelligence degree program will build on the academic and research strengths in the Department of Computer Science and Engineering and provide new educational and community engagement opportunities in the field of AI; now, therefore, be it

RESOLVED, that the Board of Trustees authorizes the School of Engineering and Computer Science to offer a Bachelor of Science in Artificial Intelligence degree program; and, be it further

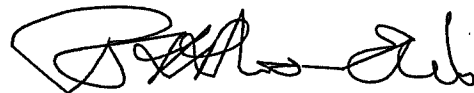
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RESOLVED, that the Executive Vice President for Academic Affairs and Provost will complete annual reviews of the Bachelor of Science in Artificial Intelligence degree program to evaluate academic quality and fiscal viability to determine whether the program should continue.

**9. Attachments:**

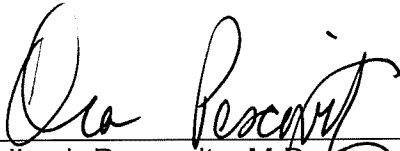
- A. Proposal for the Bachelor of Science in Artificial Intelligence degree program
- B. Proforma budget for the Bachelor of Science in Artificial Intelligence Science degree program

Submitted to the President  
on 06/22, 2023 by



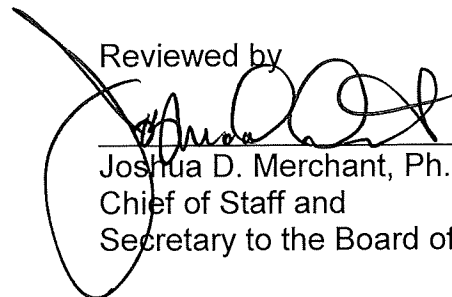
Britt Rios-Ellis, M.S., Ph.D.  
Executive Vice President for  
Academic Affairs and Provost

Recommended on 6/22, 2023  
to the Board for approval by



Ora Hirsch Pescovitz, M.D.  
President

Reviewed by



Joshua D. Merchant, Ph.D.  
Chief of Staff and  
Secretary to the Board of Trustees

Attachment A

**Program Degree: Bachelor of Science in Artificial Intelligence**

Requested Program Implementation Term: Fall 2023

**School or College Governance**

Date Submitted: November 4, 2022

Date Approved: November 18, 2022

**Department of Computer Science and Engineering**

Date Submitted: October 14, 2022

Date Approved: November 4 18, 2022

**Undergraduate Committee on Instruction**

Date Submitted: November 4, 2022

Date Approved: November 9, 2022

**Dean School or College**

Date Submitted: November 4, 2022

Date Approved: November 18, 2022

**University Committee on Undergraduate Instruction**

Date Submitted: November 18, 2022

Date Approved:

**University Governance**

Date Submitted

Date Approved

**Senate**

Date Submitted

Date Approved

**Board of Trustees**

Date Submitted

Date Approved

**Presidents Council**

Date Submitted

Date Approved

# ABSTRACT

The School of Engineering and Computer Science (SECS) proposes a new Bachelor of Science program in Artificial Intelligence (AI). This proposal is aligned with the vision of SECS to offer our students a high-quality education in AI. Thus, the Computer Science and Engineering department (CSE) led the effort to propose and offer and host this new program. The proposed program is designed to give students a comprehensive framework for Artificial Intelligence with special attention to the following set of broad AI topics: (1) Edge AI and IoT, (2) Embedded AI, (3) Human-Centered AI, Augmented/Virtual Reality and Robotics, (4) Machine Learning, (5) Smart Manufacturing and Industry 4.0, (6) Artificial Intelligence for IT Operations (AIOps), (7) AI for Cyber Security and Trustworthy AI, (8) Augmented/Virtual Reality and (9) Ethics of AI.

Students will engage in an extensive core intended to develop depth in all the core concepts that build a foundation for Artificial Intelligence theory and practice. Also, they will be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses selected from colleges throughout campus to explore key contextual areas or more complex technical AI applications. Program graduates will be well positioned to be sought after employees with top technical companies in a variety of industries in this rapidly growing field, or to progress into advanced degrees in related fields.

The BS in AI will be developed alongside the already proposed MS in AI at Oakland University. The existing research centers in AI, including the NSF IUCRC Center on Pervasive AI (PPI), will provide the necessary support to propose undergraduate research projects in collaboration with academic and industry partners. PPI currently has over 40 industry partners committed to the AI education and research missions of the center. The BS in AI program and the already proposed MS in AI program formed an advisory board of executives of leading national companies, as well as state and federal government agencies to advise SECS and OU on best practices and industry needs for AI education. All these industry partners have expressed strong support for this proposed new BS in AI.

Ensuring a steady future inflow of talent in AI engineering at all secondary education levels is critical to address persistent domestic AI workforce shortages. A unique aspect of the proposed program is the intended demographic it aspires to serve and the unique concentrations that are offered to meet the current industry demands, especially in the State of Michigan.

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# INTRODUCTION

A new program is under consideration by Oakland University's (OU) School of Engineering and Computer Science for a Bachelor of Science in Artificial Intelligence. The BS in AI will be offered by the Department of Computer Science and Engineering (CSE). CSE will collaborate with Electrical and Computer Engineering (ECE), and Industrial and Systems Engineering (ISE). This program is designed to satisfy local and national industry needs and student learning perspectives in the critical area of AI.

The program will include a strong foundation in Artificial Intelligence and Machine Learning core concepts. A total of 44 credit hours in the professional subjects will cover Artificial Intelligence, machine learning, software engineering, etc. 12 credit hours will be applied to deepening understanding in one of the following concentrations will be required: Edge AI and IoT; Embedded AI; Human-Centered AI and Robotics; Machine Learning; Smart Manufacturing and Industry 4.0; AI for Cyber Security & Trustworthy AI; and Augmented/Virtual Reality. 20 credits in Math and Science and 28 semester hours of university required general areas of study will be added to this curriculum as well as a Capstone project, for a total of 128 credit hours.

Students will be prepared in a number of different areas for employment in the public and private sectors.

- Educational Institutions: All universities, high schools, middle schools, and elementary schools
- Government Agencies: State of Michigan, NSA, DoE, DoT, and all other agencies at the county, state, and federal levels
- Military: DoD, Army, Navy, Air Force, and military contractors
- Financial Institutions/Banks and Insurance: Chase, Citi, Bank of America, all local banks in Michigan
- Hospitals and healthcare: William Beaumont Hospital, Crittenton Hospital, St. Joseph Mercy Hospital, Blue Cross Blue Shield of Michigan
- IT companies: Google, Apple, Microsoft, Amazon, Ebay, Facebook, Symantec
- All sectors of the computing industry: GM, Stellantis, Ford, DTE, Comcast
- Etc. (AI is almost used in every business domain)

Students will develop depth in all the core concepts that build a foundation for Artificial Intelligence theory and practice. They will be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses selected from colleges throughout campus to explore key contextual areas or more complex technical AI applications. Program graduates will be well positioned to attain government and industry positions in this rapidly growing field, or to progress into graduate degrees in related fields.

# RATIONALE

## Program Need

The proposed program will serve future AI engineers and professionals located mostly in the southeastern region of Michigan. This is consistent with the missions of Oakland University, one of which is to provide the knowledge and skills essential for career and personal success. The university's long-range plans call for an increase in the number of flexible high-quality degree programs that align with emerging fields and new career opportunities.

Market research has demonstrated that there are few fields with as much projected growth over the next 10 years as Artificial Intelligence. Creating a high-quality BS degree program that caters to the more technical aspects of the discipline is imperative for the university. With increased globalization of Artificial Intelligence and worldwide collaboration efforts for technology development, it is expected that students graduating with this degree will have a good opportunity for finding engineering positions in different industries in Michigan, across the United States, as well as anywhere else in the world.

The BS degree in Artificial Intelligence represents an opportunity for the Oakland University to build on its already strong portfolio of dynamic undergraduate programs. This program will support the university's effort to build a robust academic pathway to professional careers in AI. Moreover, the program will also allow students to build their technical skills and to further understand the complex human systems in which they will be implemented.

The program will provide opportunities for our faculty to understand the challenging problems in the Artificial Intelligence and technology industry, to make connections with engineers in industry, and conduct interdisciplinary translational research and collaborative research with industry partners. Such close interaction and connection will enrich the undergraduate curriculum through the development of new courses, required or elective, and the establishment of teaching labs with modern engineering equipment and software systems. The establishment of the proposed program can lead to more research funding from industry and from federal and state agencies, through strong connections with industry and collaborative translational research activities among faculty of multidisciplinary areas.

## Market Needs

According to a recent update of the Worldwide Semiannual Cognitive Artificial Intelligence Systems Spending Guide from International Data Corporation (IDC), the AI software platforms market grew rapidly during 2019 and it will continue to speed up significantly in the years 2022–2024 [6]. Thus, IDC forecasts that the overall market will reach \$13.4 billion in revenue in 2024 with a CAGR (Compound Annual Growth Rate) of 31.1% over the entire period.

To better understand the demand for jobs in Artificial Intelligence in the US, we looked into a report provided by Indeed [7], launched in 2021. Artificial Intelligence-related jobs postings on Indeed increased by 29.1% over the last year. This category of job postings on Indeed increased by 57.9% from May 2017 to May 2018 and by 136.3% between May 2016 and May 2019.

Career and job site LinkedIn [1] released its annual "Emerging Jobs" list for 2019, which identifies the roles that have seen the largest rate of hiring growth from 2015 through this year. AI specialist is number one on the list – typically an engineer, researcher or other specialist that focuses on machine learning and Artificial Intelligence, figuring out where it makes sense to implement AI or building AI systems. Hiring for this role has been tremendous, growing 74% annually in the past 4 years alone. "AI has infiltrated every industry, and right now the demand for people skilled in AI is outpacing the supply for it," as confirmed by Guy Berger, the principal economist at LinkedIn. This

is the third year in a row that a role related to machine learning or Artificial Intelligence has topped

the LinkedIn list, and we can only expect demand to increase.

Indeed [7] also identified the top 10 positions with the highest percentage of job descriptions that include the keywords “Artificial Intelligence” and “machine learning” between 2018 and 2021. Figure 1 shows the ranking for jobs. Many of the jobs requiring AI skills among 2020’s top positions are not listed in 2018’s list, such as deep learning engineer. It is interesting to note that autonomous driving, facial recognition, and robotics are the three most rapidly growing fields for 2020. This figure also brings attention to the need for graduates with high AI skills in industry nationwide but also for the state of Michigan, where the automotive industry is the main sector.

Rank	Job title	% of postings containing AI or machine learning	Rank	Job title	% of postings containing AI or machine learning
1.	Machine learning engineer	75.0 %	6.	Algorithm developer	46.9 %
2.	Deep learning engineer	60.9 %	7.	Junior data scientist	45.7 %
3.	Senior data scientist	58.1 %	8.	Developer consultant	44.5 %
4.	Computer vision engineer	55.2 %	9.	Director of data science	41.5 %
5.	Data scientist	52.1 %	10.	Lead data scientist	32.7 %

Source: Indeed

Figure 1: Top 10 Jobs involving AI skills

Indeed, also shows that machine learning engineer not only is the top AI job in terms of the number of job postings, but also offers one of the highest salaries. Figure 2 shows the ranking for salaries. Gartner CIO Survey of IT Senior Leaders shows that only 4% of surveyed organizations have already invested in and deployed AI initiatives, but that 46% of them have short- to long-term plans. Besides, this survey shows that there are two main challenges faced by senior IT leaders in exploring and adopting Artificial Intelligence: the availability of skilled and experienced staff and the lack of IT and business understanding in AI’s potential.

Rank	Job Title	Average Salary
1.	Machine learning engineer	\$ 142,858.57
2.	Data scientist	\$ 126,927.41
3.	Computer vision engineer	\$ 126,399.81
4.	Data warehouse architect	\$ 126,008.25
5.	Algorithm engineer	\$ 109,313.51

Source: Indeed

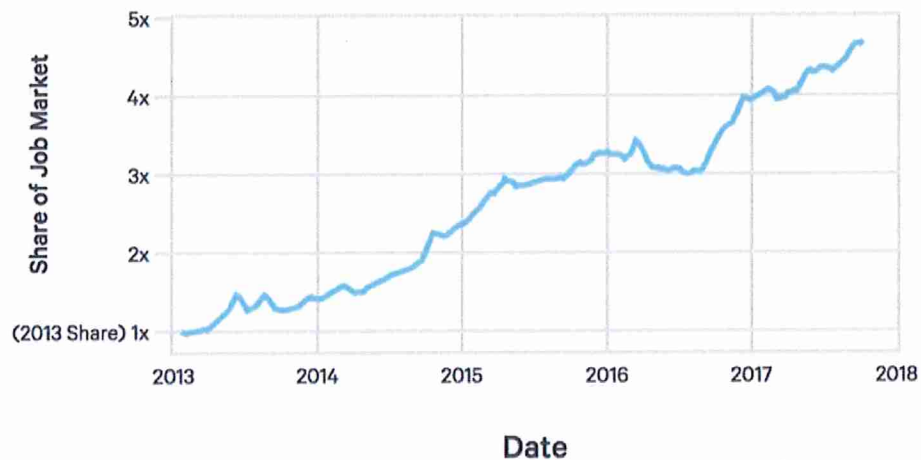
Figure 2: Top 5 AI job titles with the highest salaries

Ensuring a steady inflow of future talent in AI Engineering is among the national priorities to address persistent domestic AI workforce shortages and to remain the global leader in AI [5]. However, only around 33% of current students in AI related fields are US citizens or permanent residents, based on recent NSF/CRA 2018 surveys [5, 3]. More than half of the AI workforce in both academia and the private sector was born abroad, and U.S. companies are increasingly setting up AI labs abroad

because they cannot find enough talent at home [5]. Based on the forecast for this market [2], the expectation is that, now and in the near future, this number will be much higher. Every major type of business today is run mostly on AI, including the systems we use in government and transport, our bank accounts, and increasingly the devices that surround our daily lives.

Given the increasing demands and the high industrial investments in this area, it is necessary that the university gets involved and trains skilled leaders in the creation of Artificial Intelligence systems that will function seamlessly alongside humans. In this context, this program is aimed at achieving this goal, as well as addressing the emerging needs of this market. The proposed BS in AI will help students in the creation of systems that can reason and respond to this complex set of realities.

Indeed, points out that by first identifying AI-related jobs using titles and keywords in descriptions, the share of jobs requiring AI skills has grown 4.5X since 2013 (see Figure 3).



Source: Indeed

Figure 3: Share of US jobs requiring AI skills

## Relationship of AI with Data Science, Machine Learning, and Robotics

Artificial Intelligence, data science, machine learning, and robotics are terms commonly used in the popular press/media but are difficult to attach precise meanings to. Nevertheless, from a technical perspective, there is a shared understanding of what these terms stand for. While it is very unlikely that experts in these domains will all agree on ironclad definitions of the terms, we discuss in this section at a high level the relationship between these four areas.

The term Artificial Intelligence was first coined by John McCarthy in 1956. In that decade, researchers came together to clarify the concepts around the “thinking machine,” which up to that point had been quite divergent. McCarthy is said to have picked the name Artificial Intelligence for its neutrality. Nowadays, AI is defined as the development of intelligent algorithms and systems that allow such systems to act or be perceived to act intelligently. AI has traditionally been pursued as a subarea of computer science; research in the area brings in innovative ideas from other fields, including mathematics, philosophy, psychology, social science, and linguistics.

Machine learning (ML) can be defined as a field of computer science that gives computer systems the ability to “learn” with data without being explicitly programmed. However, in the last decade, the field has transformed into a major research area of computer science.

Data science is an interdisciplinary field of scientific methods, processes, algorithms, and systems to extract knowledge or insights from data in various forms, either structured or unstructured (Wikipedia).

Robotics is an interdisciplinary branch of engineering and science that includes mechanical engineering, electrical engineering, computer science, and others. Robotics is at the intersections of electronics, computer science, AI, mechatronics, nanotechnology, and bioengineering. Robotics addresses design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing.

AI intersects with data science (DS) and robotics (ROB), with techniques from machine learning (ML) playing a major role in all three areas. AI includes subareas such as knowledge representation, cognitive modeling, perception, human-computer interaction, and natural language processing that are not well represented in Data science and robotics. ML is a sub-field of AI. However, there may be some disagreement on this, as machine learning has emerged as a separate field of its own. Based on feedback from the industry executives board of this new program and the market assessment, there are major differences between AI Engineers and Data Engineers/Scientists or Computer Scientists/Engineers. AI engineers focus on the design, implementation, and testing/evolution/maintenance of the models unlike data engineers/scientists who focus more on the preparation of the data to be used by those ML models including data cleaning, sampling, sanitization, etc. This proposal focuses on training and preparing new AI engineers.

### Research and Teaching Needs

There has been rapid growth in the hiring of professors who work in AI as well as in co-related areas that either exploit AI techniques or provide some of the basic science used to develop those techniques. This is evidenced by the fact that professors from all SECS departments are involved in this current proposed list of courses.

Another important motivation for this new degree is from a research perspective. Given the number of active researchers in AI, there will be opportunities for professors and students to perform research together on the many AI research projects being pursued in Southeast Michigan, as well as the possibility for BS students to continue onto an MS program in computer science or related domains. The BS in AI will develop students strong in the core AI discipline and its applications by integrating AI research and educational activities, increasing collaboration within Oakland University and establishing an exciting AI learning environment for students in collaboration with the strong support of industry partners.

### Survey with Current Students, Alumni and Industry

During the Winter and Summer terms of 2022, the SECS interdisciplinary committee on AI and DS conducted surveys with 157 participants including our current students, alumni and industry/government. As described in Figure 5, almost half of the participants are from our current OU students in SECS and the other half represent industry participants.

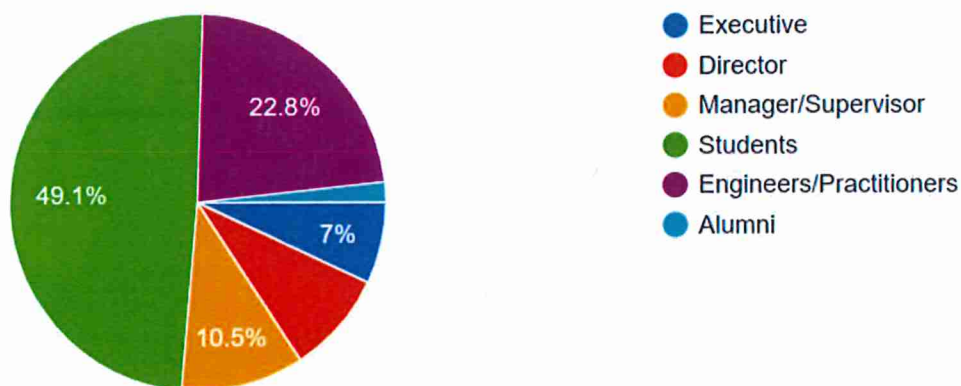


Figure 5: Distribution of the participants

Depending on the position of the participants, we prepared two surveys where the first survey was for industry/government executives to gather interest in new degree programs in AI and the needed skills, while the second survey was for students to evaluate their interest to join the program, why they would be interested and the preferred teaching modalities. The survey shows a very strong interest from executives in leading national companies to train their employees for AI for now and at least the next 10 years. They highlighted, as shown in Figure 6, the most needed skills especially in Machine Learning, Human-Centered AI/AI Ethics, Edge AI, etc. Those needs have guided our choices in terms of the concentrations for the new BS and MS programs in AI.

Q4. From the following topics, please indicate any topics or subject matter that you think should be considered for inclusion

15 responses

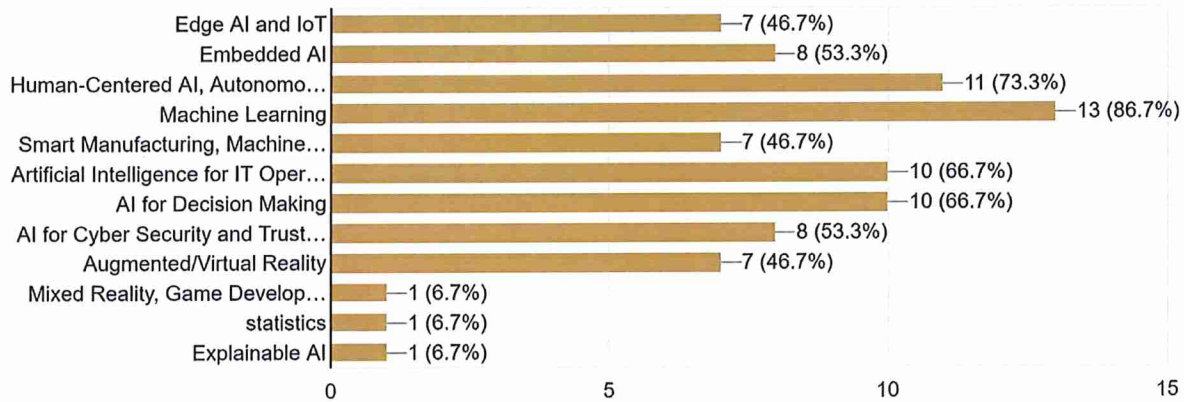
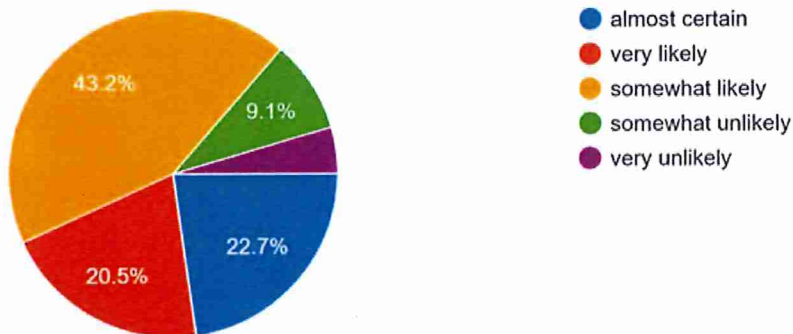
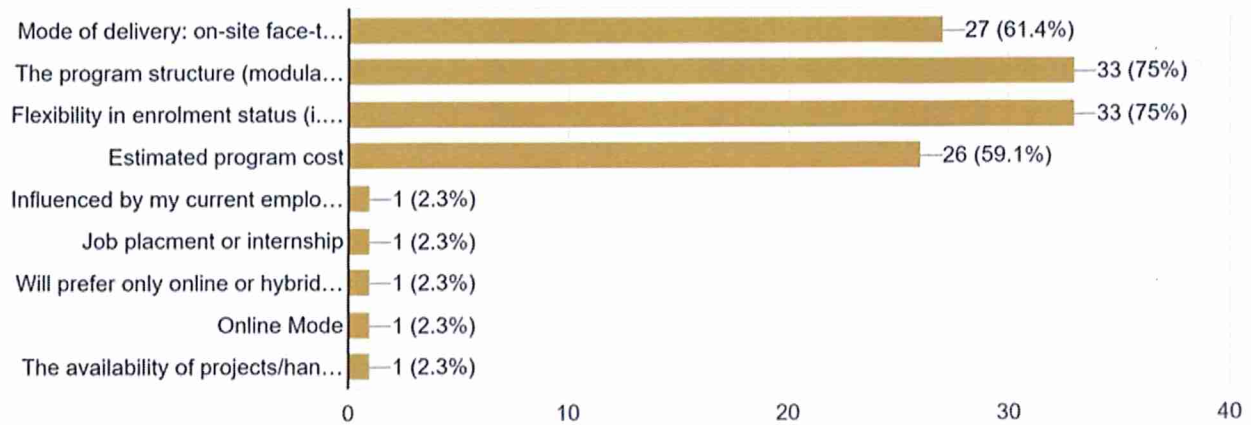


Figure 6: Industry executives opinion on the needed AI skills

Q2. Rate the likelihood of submitting an application for admission to the proposed program if it were launched within the next 1-2 years? (almost c...somewhat likely, somewhat unlikely, very unlikely)



Q5. Is your interest in the program influenced by the following (check all that apply)



Q6. What is your preferred mode of delivery?

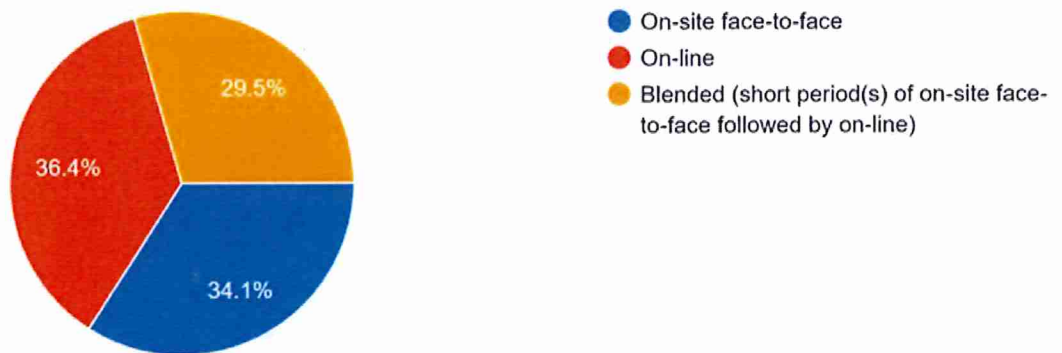


Figure 7: Outcomes of the survey with potential students

Figure 7 describes a very strong interest from our students and alumni to join the BS in AI with over 90% of them very likely to apply when the program is offered. The flexibility/modularity of the program (and the teaching modality/flexibility are among the most important factors that the student would consider joining the program, as described in the figure. To conclude, the survey with different stakeholders shows a large interest in this new proposal for the BS in AI.



## How Program Will Promote the Role and Mission of the University and College/School

Oakland University's mission and vision reflects the cultivation of full potential of our entire community. Artificial Intelligence uses reasoning based in modeling and learning rather than traditional logical reasoning, demonstrating a new method of thinking by machines that is currently in use every day, affecting science and engineering, business, government, medicine, entertainment, communication, and the very research work that we do in so many fields. Artificial Intelligence is a rising field, related to but specialized from computer science, with applications in all economic sectors that affect our daily lives. Our vision to "unlock the potential of individuals and leave a lasting impact on the world" will be realized in our program offerings in such high impact areas as AI. If we expect our graduates to have a lasting impact on society, there are few fields as with as much potential as Artificial Intelligence by which to inspire that impact. Our graduates will embody the mission and vision of Oakland University.

The mission of the School of Computer Science & Engineering at OU is to provide high quality programs "to prepare graduates for careers in the upcoming decades...in relevant branches of engineering and computer science." By expanding our technology-based undergraduate programs we will be doing just that - AI careers in the upcoming decades are expected to be one of the highest demand careers across many industries, as reflected in our research on labor projections, included in this proposal.

Finally, the Department of Computer Science & Engineering also has a mission/vision statement, written collaboratively by our faculty, which includes:

**Our Mission:** Empower everyone to learn cutting edge computing skills through hands-on and foundational education and research to meet real-world challenges in Michigan and beyond.

**Our Vision:** To be a department of choice for anyone in Michigan and beyond who wants to use computing to positively impact their community.

### Our Values:

Transparency | Fairness | Diversity | Equity | Inclusion | Respect | Integrity | Shared governance  
| Excellence | Responsibility | Flexibility | Freedom | Care

For the CSE department to meet our mission and vision we need to develop and execute programs that educate students on cutting edge skills that meet real world challenges, while positively impacting our communities at OU and beyond. The proposed BS in AI program would help us to accomplish our mission and vision, while contributing to the mission and vision of SECS and OU.

## Program Goals

The objective of the BS in AI is to graduate AI Engineers by achieving the following goals:

**Goal 1:** Understand representations, algorithms and techniques used across works in Artificial Intelligence and be able to apply and evaluate them in applications as well as develop their own.

**Goal 2:** Understand and apply machine-learning techniques, in particular to draw inferences from data and help automate the development of AI systems and components.

**Goal 3:** Understand the various ways and reasons humans are integrated into mixed human-AI environments, whether it is to improve overall integrated system performance, improve AI performance or influence human performance and learning.

**Goal 4:** Understand the ethical concerns in developing responsible AI technologies.

**Goal 5:** Implement AI systems, model human behavior, and evaluate their performance.

### Comparison to Similar Programs (State/National)

In past years, Artificial Intelligence was considered a subset of computer science with regard to measuring graduates. Thus, computer science-related programs continued to grow over 100% between 2012 and 2016. In a US-centered analysis, interest in Artificial Intelligence research is growing fast and there is no sign of it slowing down anytime soon, as can be seen by the recent NSF call for proposals and the AI executive order. Research II universities are starting to develop undergraduate programs, including concentrations, minors, and full majors in AI. Table 1 shows an overview of the immediate competitors in the Artificial Intelligence BS program space.

Table 1: BS in Artificial Intelligence’s competitors

University	Degree	Host College/School
Ferris State University	BS in Artificial Intelligence	College of Business, Accountancy, Finance, & Info Systems Department
Indiana University-Purdue University Indianapolis	BS in Artificial Intelligence	Purdue School of Engineering & Technology
Indiana University-Purdue University Indianapolis	BS in Artificial Intelligence	School of Science
Indiana University-Purdue University Indianapolis	BS in Artificial Intelligence with concentration in Human-Computer Interaction	School of Informatics & Computing
Illinois Institute of Technology	BS in Artificial Intelligence	Department of Computer Science, College of Computing
Carnegie Mellon University	BS in Artificial Intelligence	School of Computer Science
Dakota State University	BS in AI	Beacom College of Computer & Cyber Sciences
Long Island University	BS in AI	School of Computer Science & Innovation
Duke University	BS Concentration in AI & Machine Learning	Department of Computer Science

The main originality of the proposed BS in AI compared to the competitors of Table 1 is the focus on areas needed by the local industry in automotive and beyond including Edge AI, Embedded AI, Smart Manufacturing, etc. None of the existing programs are focusing on this area but more on the foundations of AI. It will be among the first undergraduate programs in AI offered in the State of Michigan. The interdisciplinary nature of the program makes it unique as well compared to the competitors to expose the students to courses offered by ECE and ISE to equip them with the needed skills in Embedded AI, Smart Manufacturing and Industry 4.0.

# ACADEMIC UNIT

## How Program Supports Goals of the Unit

The proposed program will serve engineers and professionals in Computer Science located mostly in the southeastern region of Michigan. This is consistent with the missions of the Department and of Oakland University, one of which is to provide the knowledge and skills essential for career and personal success in computer science. The department's long-range plans call for an increase in the number of flexible high-quality degree programs that align with emerging fields and new career opportunities, especially in STEM education.

Given the increasing demands and the high industrial investments in this research area, it is necessary that the university gets involved and trains skilled leaders in the creation of Artificial Intelligence systems that will function seamlessly alongside humans. In this context, this program is aimed at achieving this goal, as well as addressing the emerging needs of this market. The proposed BS in AI will help students in the creation of systems that can reason and respond to this complex set of realities.

The AI program will help increase both the quality and quantity of students in the department so the department can offer a more diverse set of courses and continue expanding teaching and research efforts.

The BS in AI Program will:

- Produce competent Bachelor of Science (BS) students to meet the current and futuristic global and national AI challenges. These students will significantly improve the reputation of Oakland University by exemplifying their technical skills, leadership, and professionalism.
- Develop an innovative program that is marketable to governmental and private industry agencies. Automotive, healthcare, defense, and financial-related organizations are in dire need of a skillful AI workforce.
- Attract qualified faculty with AI specialties.
- Increase enrollment to undergraduate students with career goals in AI.
- Meet the staffing needs of the industry.

## Staffing Needs

The proposed BS in AI program will be hosted by the CSE department. One program director will be responsible for administering the program and they will be supported by a CSE administrative assistant. The program director will be the chair of the AI Undergraduate Program Committee. Three other faculty members will be responsible for administering the program representing each of the departments contributing to the program such as CSE, ECE and ISE.

The responsibilities of the undergraduate program director will include marketing the program locally by keeping a close relationship with the local industry, synchronizing efforts with SECS to promote the program, coordinating the scheduling of courses and instructors, finding qualified lecturers and guest speakers from local industry to complement the full-time faculty of the program, arranging for initial individual counseling meetings with students admitted to the program, applying undergraduate program policy appropriately to accommodate the individual graduation plans of students, and promoting an educational focus in the areas of core and applied AI. The director will also be responsible for the overall quality of the program, including monitoring the academic qualifications of the students admitted to the program, updating the curricula, and periodically assessing of the program.

The CSE Undergraduate Program Committee will advise and assist the program director in matters related to review of applications, admission to the program, dismissal from the program, and program updates. The Undergraduate program director will be appointed by the CSE department chair.

The BS in AI program will reside in CSE department. A full-time secretary in the CSE department will provide support for this program, as well as the SECS Advising office. The program would require one new Assistant Professor to be hired in the 2<sup>nd</sup> year of the program. The newly hired faculty member will eventually cover the few new classes.

## **Faculty Qualifications**

The Department of Computer Science and Engineering currently employs several experienced academic professionals in AI who have the capability of teaching students, evaluating students' learning, monitoring students' study progress, and directing and facilitating websites for courses. For a list of faculty profiles, see Appendix A.

## **Impact on Current Programs**

The BS in AI Program will bring tremendous impact to the current degree programs at Oakland University as follows:

- The proposed program will significantly increase the enrollment of students who would like to choose Artificial Intelligence as their future career.
- The proposed program will develop a complete set of curricula for AI that significantly improves the AI teaching and research capabilities at Oakland University (OU). The newly developed courses will be available and beneficial to students majoring in Computer Science (CS) and Information Technology (IT), Electrical and Computer Engineering (ECE) and Industrial Systems Engineering (ISE) thus enhancing the existing BS programs offered by the School of Engineering and Computer Science.
- The proposed program will further strengthen the pipeline that leads to the Master of Science in AI at OU. The curricula of the proposed program can be cross-listed and shared with other relevant graduate programs.
- The proposed program will benefit a broader range of degree and certificate programs in other departments and schools, which would like to educate their students with AI concepts, principles, paradigms, technologies, and skills.

## **Classroom, laboratory and/or studio space**

Enrollment in the core and foundation classes will be combined into the current Computer Science graduate courses. The BS in Artificial Intelligence students will register in classes that currently exist. Thus, we will use the existing classroom, laboratory and/or studio space. A new AI Lab is established in the new building of SECS that will be used to provide support to some courses and also undergraduate research experiences in AI.

## **Equipment**

No additional space or special equipment will be required for the program. All implementations will use available space and resources of the existing labs of the AI faculty.

# PROGRAM PLAN

## Admissions Requirements

Generally, freshman admission to Oakland University is based on a combination of criteria:

- A completed Oakland University [admission application](#). While an essay is optional, interested students may choose to include an essay for consideration.
- Cumulative high school grade point averages of 3.2 or above. Applicants with cumulative grade point averages below 3.2, but above 2.5, may be admitted after consideration of the quality of academic preparation. Scholarship awards are based on a student's academic record at the time of admission. However, students may submit updated transcripts and/or test scores for scholarship reconsideration until the March 1 scholarship priority deadline.
- SAT or ACT scores are no longer required for the incoming classes of 2022, for students with a minimum high school GPA of 2.5. You can find more information regarding our test-optional policy [here](#).
- Number and types of college preparatory courses
- Positive trend of grades

Additionally, students must meet their state graduation requirements. First-year college students interested in applying to Oakland University's [Honors College](#) should check their [additional admission criteria](#).

We strongly encourage students to follow a college preparatory curriculum that includes:

- Four years of English
- A minimum of three years of mathematics, including intermediate algebra
- A minimum of three years in social sciences
- A minimum of three years in biological/physical sciences
- A minimum of two years in a foreign language

Oakland University **does not** require letters of recommendation as part of the application for freshman admission.

Admission of individuals whose formal education has been interrupted for three or more years, and who would not normally meet other admission criteria, may be considered based on one or more of the following: sustained employment record; recommendations from employers, educators, and other professionals; and standardized test results. An interview with an Oakland University Admissions Adviser is required for such applicants to be considered for admission.<sup>11</sup>

## Degree Requirements

To earn a Bachelor of Science degree in AI students must complete a minimum of 128 credits and meet the following requirements:

General education – Per University  
Requirements

Mathematics and sciences – 20 credits

AI core – 18 credits

Required professional subjects – 44 credits

Professional track – 12 credits

Professional electives – 6 credits

Proposed total: 128 credits

To enroll in 3000- or higher-level courses and to become candidates for the degree of Bachelor of Science in AI, students must gain a major standing. An application for major standing should be submitted prior to intended enrollment in 3000- or higher-level courses. Forms may be obtained from the SECS Undergraduate Advising Office or from the SECS website.

To gain major standing in AI, students must:

- A) have an average GPA of 2.0 in the following mathematics and science courses:  
MTH 1554, MTH 1555, MTH 2775, APM 2663, and STA 2226.
- B) have an average GPA of 2.0 in the following AI core courses: CSI 1420/1320, CSI 2300, CSI 2310, CSI 2490, and CSI 2999.
- C) have no more than two grades below C in the courses listed in A and B above.
- D) have not attempted any course listed in A and B above more than three times.  
Students may petition to repeat a course a fourth time.
- E) have not repeated more than three different courses listed in A and B. Courses in which a W (withdrawal) grade is recorded will not be counted.

Conditional major standing may be granted in the semester in which the student will complete requirements A and B above. Satisfactory completion of the program requires an average grade of at least 2.0 within each group: mathematics and sciences, computer science core, and professional courses (including required professional subjects, professional electives, and professional track). Within professional courses at most two grades below C are permitted, at most two different courses may be repeated, and a total of three attempts per course is permitted.

## Overview of Curriculum

The Bachelor of Artificial Intelligence degree provides students the opportunity to gain cutting-edge AI knowledge and skills with a solid theoretical foundation as well as a good understanding of different application areas. This bachelor program prepares students for a productive career in industry, lifelong learning, and for graduate study in AI. The new degree is strategically designed to build on the strengths of existing computing programs on campus and produce well-rounded students with a balance between strong theoretical foundations as well as practical and hands-on technical skills. The program also includes a strong professional component for the development of skills in technical communication, ethics, and teamwork. The program was designed to satisfy the local and national industry needs and student learning perspectives. We note that ABET is not currently offering accreditation for degrees in AI and we will satisfy their requirements once they are available to apply for accreditation.

## Course requirements (minimum of 128 total credits)

To earn a Bachelor of Science degree with a major in Artificial Intelligence students must complete a minimum of 128 credits and meet the following requirements:

### General education

The General Education Requirements are composed of three parts: Foundations, Explorations, and Integration. In addition, U.S. Diversity requirements must also be met. For details, refer to the General Education section of the catalog. In order to satisfy both general education and other program requirements, in some of the general education areas students should select from the courses listed below.

Foundations:

- Writing Foundations (WRT 1060)
- Formal Reasoning (Satisfied by MTH 1554; see Mathematics and sciences)

Explorations: One course from each of the seven Explorations areas

- Arts
- Language and Culture
- Global Perspective
- Literature
- Natural Science and Technology (Satisfied by an approved science elective with lab; see Mathematics and Sciences)
- Social Science
- Western Civilization (Satisfied by PHL 1310; see additional major requirements)

Integration:

- Knowledge Applications (Satisfied by MTH 1555; see Mathematics and sciences)

U.S. Diversity:

- May be met by an approved course in the Explorations area.

Writing Intensive and Capstone:

- Capstone (Satisfied by CSI 4999; see Required professional subjects)
- Writing Intensive in the Major (Satisfied by CSI 4999; see Required professional subjects)
- Writing Intensive in General Education (may be met by an approved course in the Explorations area)

Additional Major Requirements:

All students must complete the following requirement.

- Professional Ethics: PHL 1310 - Introduction to Ethics in Science and Engineering

In order to graduate on-schedule without taking additional courses, it is highly recommended that students meet with SECS Undergraduate Academic Adviser concerning the selection of all of their general education courses.

### **Math and Statistics [ 20 credits]**

- **APM 2663 - Discrete Mathematics (4)**
- **STA 2226 - Applied Probability and Statistics (4)**
- **MTH 1554 - Calculus I (4)**
- **MTH 1555 - Calculus II (4)**
- **MTH 2775 - Linear Algebra (4)**

### **Artificial Intelligence Core [18 credits]**

- **CSI 1420 - Introduction to C Programming and Unix (4) or CSI 1320 - Introduction to Python Programming and Unix (4)**
- **CSI 2300 - Object-Oriented Computing (4)**
- **CSI 2310 - Data Structures (4)**
- **CSI 2490 - Introduction to Artificial Intelligence: Representation, Concepts and Problem Solving (4)**

- **CSI 2999 – Sophomore Project (2)**

**Required professional subjects [44 credits]**

- **CSI 3370 - Software Engineering and Practice (4)**
- **CSI 3610 - Design and Analysis of Algorithm (4)**
- **CSI 3430 - Theory of Computation (4)**
- **CSI 4130 - Artificial Intelligence (4)**
- **CSI 4810 - Information Retrieval and Knowledge Discovery (4)**
- **CSI 4140 - Deep Learning and Applications (4)**
- **CSI 4100 - Ethics and Bias in AI (4)**
- **CSI 4170 - Machine Learning (4)**
- **CSI 4180 - Natural Language Processing (4)**
- **CSI 4150 - AI for IT Operations (4)**
- **CSI 4999 - Senior Capstone Project (4)**

**Depth areas/ Professional track [12 credits]**

Select one of the following professional tracks

A) Edge AI and IoT Track

- **CSI 4110 - Foundations of Edge AI (4)**
- **CSI 4230 - Mobile Application Development (4)**
- **CSI 4240 - Cloud Computing (4)**

B) Embedded AI Track

- **ECE 4731 - Fundamentals of Embedded System (4)**
- **ECE 4900 - ST: Embedded Artificial Intelligence (4)**

Choose one from following courses:

- **ECE 4520 - Automotive Mechatronics I (4)**
- **CSI 4110 - Foundations of Edge AI (4)**



C) Human-Centered AI and Robotics Track

- **CSI 4800 - AI-Human Interaction (4)**

**Choose two from following courses:**

- **CSI 3500 - Human Computer Interaction (4)**
- **CSI 4550 - Visual Computing (4)**
- **ECE 4510 - Machine Vision (4)**
- **ECE 4551- Human-Robot Interaction (4)**
- **ECE 4500 - Robotic Systems and Control (4)**
- **ISE 4422 - Robotic Systems (4)**
- **ISE 4900 - Special Topics (2 to 4)**
- **ISE 4441 - Human Factors Engineering (4)**

D) AI for Cyber Security and Trustworthy AI Track

- **CSI 4580 - AI for Cybersecurity and Privacy (4)**

**Choose two from following courses:**

- **CSI 4370 - Software Verification and Testing (4)**
- **CSI 4700 - Software Security (4)**
- **CSI 4560 - Mobile Security (4)**
- **CSI 4790 - Automotive Security (4)**
- **CSI 4520 - Industrial Control Security (4)**
- **ECE 4780 - Embedded Security (4)**

E) Augmented/Virtual Reality Track

- **ISE 4900 - Special Topics (2 to 4)**
- **CSI 4550 - Visual Computing (4)**

**Choose one from following courses:**

- **CSI 3380 - Game Design (4)**
- **CSI 4380 - Game Programming (4)**
- **ECE 4510 - Machine Vision (4)**

F) Smart Manufacturing and Industry 4.0 Track

**Choose three from following courses:**

- **ISE 4410 - Supply Chain Modeling and Analysis (4)**
- **ISE 4423 - Industrial Automation Systems (4)**
- **ISE 4435 - Data Analytics**
- **ISE 4900 - Special Topics (2 to 4)**
- **CSI 4800 - AI-Human Interaction (4)**
- **ECE 4551- Human-Robot Interaction (4)**

## **Professional Electives [6 credits]**

2 Credits of the following 2000 level courses:

- **CSI 2320 - C++ for Programmers (2)**
- **CSI 2330 - Immersive Python (2)**
- **CSI 2340 - Ruby for Web Developers (2)**
- **CSI 2350 - Programming in Visual C# for .NET Technology (2)**

And: 4 credits from one of these options:

- Any class in one of the depth areas not chosen as a primary specialty
- Courses at the 5000 level, with instructor approval.
- Any 3000 or 4000 level class in Engineering, Computer Science, or Mathematics not currently part of the AI curriculum.

## Description of New classes

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- 1- **CSI 2490 - Introduction to Artificial Intelligence: Representation, Concepts and Problem Solving (4)**  
**Catalog Description:** This is an introductory course to artificial intelligence that covers fundamental topics in AI, including search, reasoning, knowledge representation, and planning. The goal of this course is to provide an overview of the artificial intelligence field. Through lectures, discussions, and homework assignments, students will learn basic AI concepts and principles. The course will prepare students to further exploration of AI with a focus on reasoning and knowledge representation.  
Prerequisites: Major standing.
  
- 2- **CSI 4110 - Foundations of Edge AI (4)**  
**Catalog Description:** The course covers many topics including the importance of power efficiency, latency, and bandwidth considerations for AI/ML implementation on edge devices. The course will cover how computing can be distributed between the edge devices and the cloud. The latest trends and applications of Edge AI in automotive, and industrial use cases will also be discussed. This course will also explain and demonstrate how AI/ML logic can be implemented on Edge devices such as smart sensors. Cross-listed with CSI5160.  
Prerequisites: Major standing.
  
- 3- **CSI 4150 - AI for IT Operations (4)**  
**Catalog Description:** This course introduces participants to MLOps tools and best practices for deploying, evaluating, monitoring and operating production ML systems on the Cloud. MLOps is a discipline focused on the deployment, testing, monitoring, and automation of ML systems in production. The students will learn and use tools for continuous improvement and evaluation of deployed models. The course will cover different best practices to improve the velocity and rigor in deploying the best performing models. Cross-listed with CSI5150.  
Prerequisites: Major standing.
  
- 4- **CSI 4100 - Ethics and Bias in AI (4)**  
**Catalog Description:** In this course students will acquire the tools to critically think, read, and write about AI in sociotechnical contexts. They will master the vocabulary and concepts necessary to identify, interrogate, and plan for the ethical implications of AI as a technological, social, and cultural phenomenon. Students will learn rudimentary, but important, aspects of intelligent computational modeling and processing so that they can appreciate the implications of AI on the general public. Topics addressed in the course include the technical, social, safety, and economic implications of AI- enabled automation, including bias in datasets and resultant AI models. Cross-listed with CSI5170.  
Prerequisites: Major standing.
  
- 5- **CSI 4800 - AI-Human Interaction (4)**  
**Catalog Description:** This AI-human interaction course aims to teach the current state of the art and techniques for creating human-computer interfaces that make AI usable, useful, and explainable to the end user. Professional designers of AI- human interaction leverage skills other than programming, and this is not a programming course. Rather, the course gives hands-on exposure to techniques used

in industry to rapidly create and assess interfaces for AI-human collaboration, as well as knowledge of prescient issues with AI- human interaction that the industry is trying to address. Cross-listed with CS15485.  
Prerequisites: Major standing.

## **Support of Other Departments and Academic Units**

Support for the proposed degree from other departments at Oakland has been very good, with letters from different departments and also industry partners. For specific letters of support, please refer to [Appendix D](#).

## **Source of Students**

Based on the study of national trends and related programs in Michigan and the surrounding states, it is expected that the program will attract many new students. Meanwhile, we anticipate that some students may transfer from CS, IT, CE, and EE majors. These are usually students with strong interest in AI and its assorted specialty topics. The proposed new major would help retain these students by providing them with additional options. Some students looking for a career in AI may transfer to other universities if Oakland University fails to offer this degree.

We also anticipate that this program will be of interest to students with more than one major, as well as help retention by providing students with additional options on AI.

## **Recruiting**

- Open House
- Radio
- Flyers
- Affiliating agencies
- Mailing list
- Newspapers and journal advertisement
- SECS and CSE web pages
- Presentations by faculty and/or graduate students at local schools

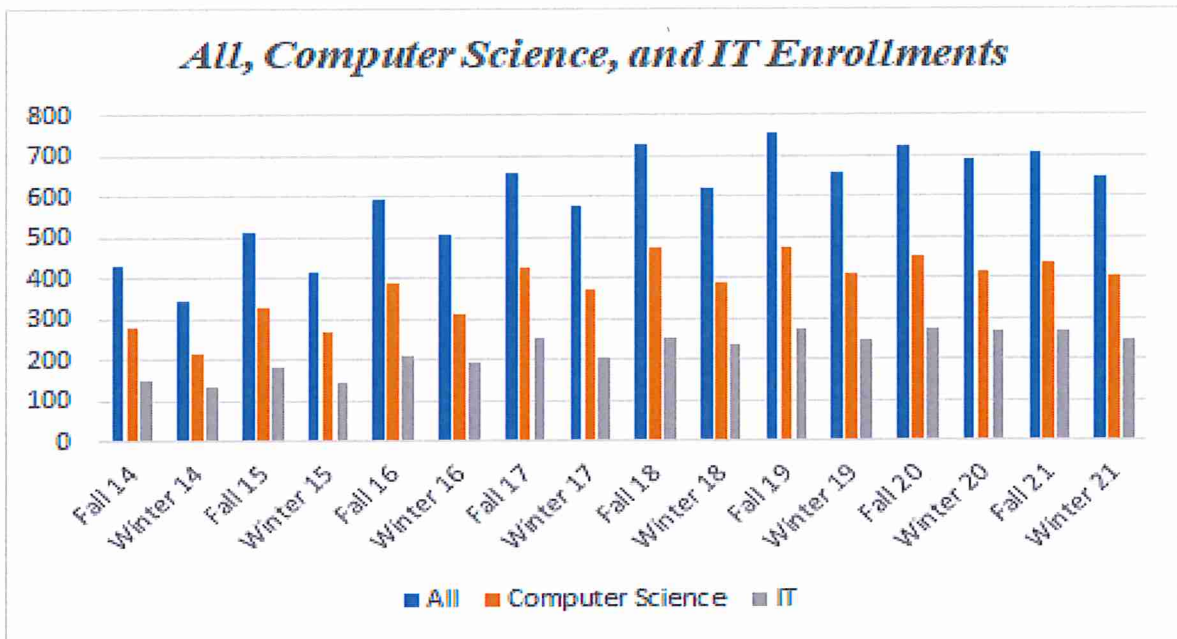
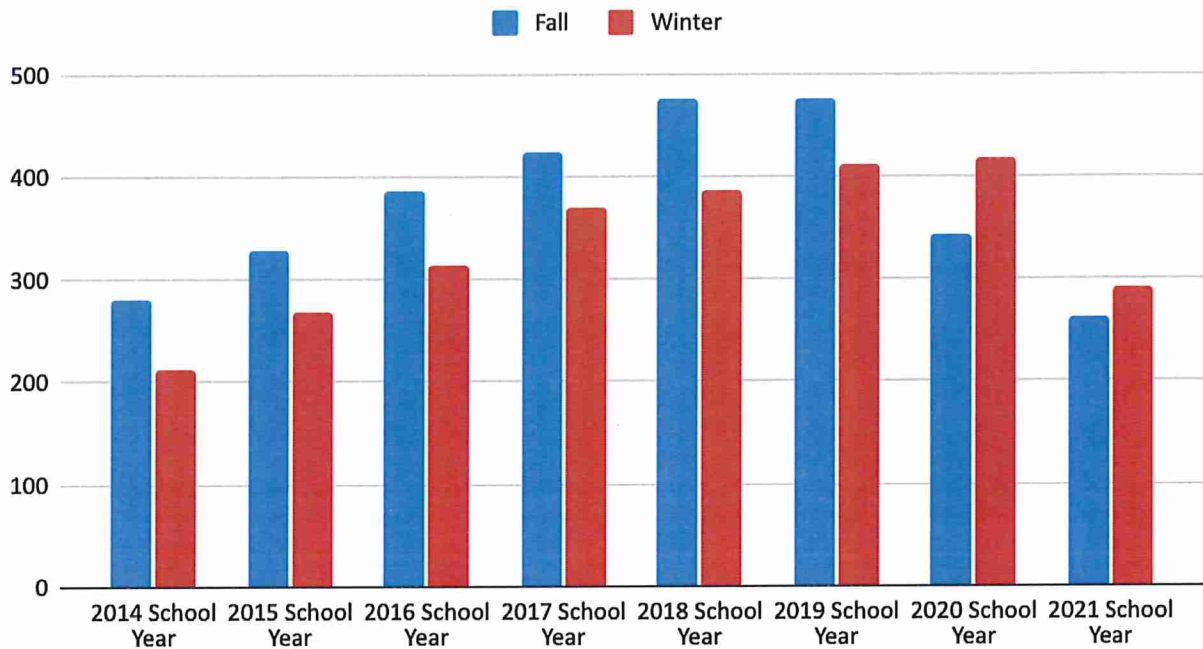
Potential students are likely to be acquired through the intervention of a targeted marketing campaign, including, but not limited to those things defined above. A survey of student interest is also recommended in the high schools adjacent to campus. By raising awareness of Artificial Intelligence as a degree path option, we will be able to attract significant number of students especially that only very few competitors are offering a BS in AI. In addition, Oakland University was recently awarded two new research centers on AI by NSF and Department of Energy which will offer multiple scholarships for students. Admission of students from other institutions who wish to transfer credits will be considered per university policy. A sample of transfer credits courses from local colleges is presented in Appendix G.

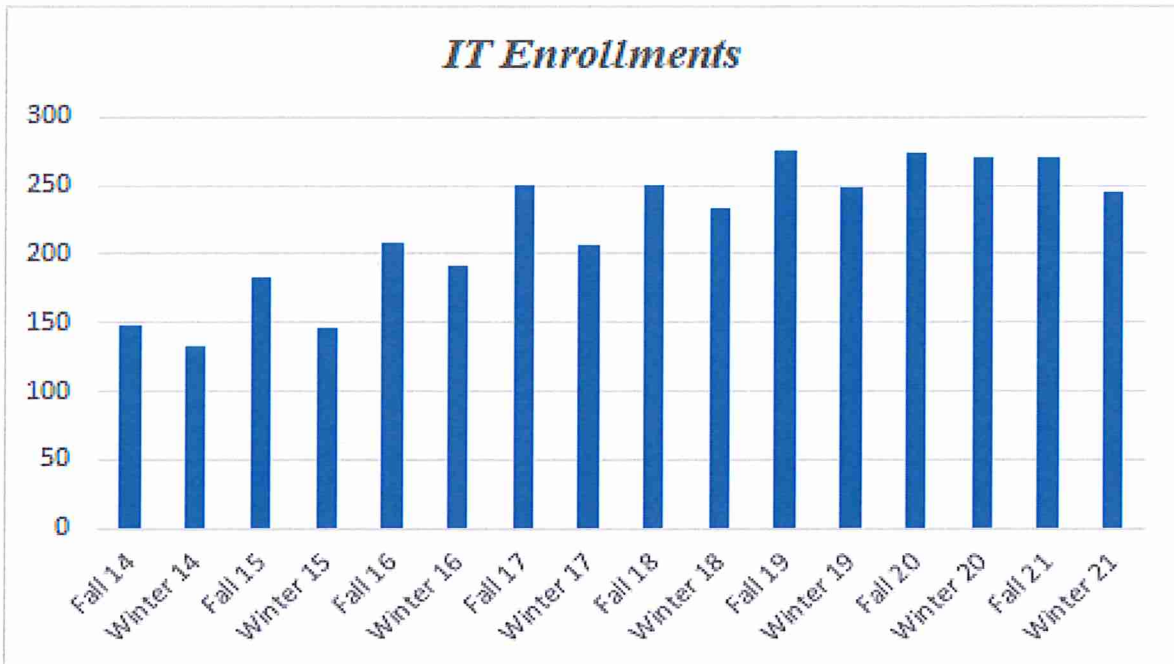
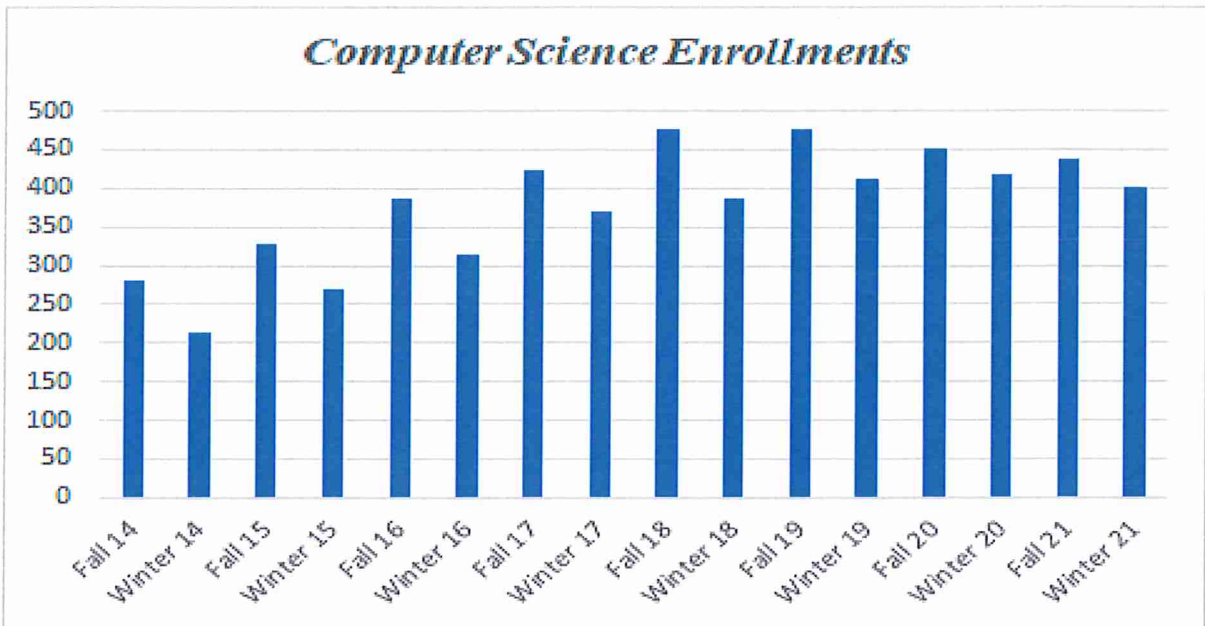
## **Expected Enrollment**

The undergraduate enrollment for both Computer Science and IT students, as shown in figures below, has been on a steady and healthy rise at the Department of Computer Science and Engineering, in the past seven years. Based on these numbers and their upward trends, it is expected that this program will enjoy a similar initial enrollment and continuous steady growth after its initial offering. Enrollment numbers for the new program can be found in Appendix E. These numbers are cautiously optimistic and depend greatly on the program's start date and

degree of promotion. When compared to another recent Artificial Intelligence degree offering at the University of Michigan Dearborn, roughly comparable to Oakland University in size and enrollment, that program attracted over 40 students even from the first term. The numbers in Appendix E follow this trend.

### Computer Science Enrollment Year Over Year





## Academic Advising

Student retention is critical to ensure self-sustainability and high quality of the program. The program will strive to retain a high-quality student enrollment by implementing the following retention plan:

- Set up mentoring for new students to ensure they have clear understanding about the curriculum and milestones/requirements for the successful completion of the program.
- Early identification of students who are performing poorly in the program and make sure appropriate support is presented to these students.
- Ensure sufficient academic advisory to students by coordinating efforts of both the faculty and the academic advisors

- Hosting regular AI seminars: bring experts to campus to update students the state of the art in the area
- Encourage students to attend professional societies such as IEEE and ACM and participate in activities held by student-organized study groups.
- Provide professional development opportunities and internships for students who are close to their graduation.
- Help potential employers who may be interested in the graduates of the program to know our program and graduates better by holding AI job fairs and workshops
- Help graduates to market themselves in their job placement by hosting their resume and homepage on the department's website

## NEEDS AND COSTS OF THE PROGRAM

### A. New Resources Needed for the Program

- Faculty positions: one new full-time faculty
- Staff positions: None. We will use existing resources
- Library Holdings: see library report
- Space: none projected
- Equipment: none projected

### B. Source of New Resources

Tuition revenue projections are based on the pro forma budget analysis in Appendix E for each year in the degree program. Expenses include salaries and operating expenses. Salaries include full-time faculty (one assistant professor). The new faculty member assist to develop and teach new classes and to teach new sections of some existing courses such as CSI 1320, CSI 1420, etc. In the first two years faculty inload is added. Support for one PhD graduate assistant in the first year, two in the subsequent years is also offered for consideration.

Marketing expenses may be significant in the first year but it is felt that an aggressive campaign will draw students to Oakland. Artificial Intelligence is an attractive field for potential OU applicants and a substantial marketing campaign may make Oakland an attractive choice. A justification of expenditures may be found in Appendix F.

Operating expenses include supplies and services, travel, library, and Graduate tuition. Travel, including faculty travel, includes attendance at state and national meetings. Operating expenses for supplies and services, equipment, maintenance, and the library are described in the following sections.

- C. 5-Year Budget and Revenue from Program **Appendix E**
- D. Library – Include library assessment report (**following section**)
- E. Classroom, Laboratory, Space needs  
Not applied as we will use existing resources.
- F. Equipment Needs  
Not applied as we will use existing resources.

# Library Budget Report



November 15, 2022

**To:** Marouane Kessentini, Professor and Chair, Department of Computer Science and Engineering, School of Engineering and Computer Science (SECS)

**From:** Helen Levenson, Associate Professor and Collection Development Librarian, University Libraries  
James E. Van Loon, Assistant Professor and Liaison Librarian to SECS, University Libraries

**Re:** Library collection evaluation for proposed B.S. program in Artificial Intelligence

In developing this collection evaluation, we reviewed the draft proposal for the bachelor's program in artificial intelligence, as well as title lists of core journals and resources in the field. We also compared it to our recent (September 15, 2022) collection evaluation for the proposed M.S. program in AI. This comparison exposed significant similarities between the two proposed programs:

- Topic areas: broad AI topics for both programs are similar.
- New courses: with one exception (CSI 2490 - Introduction to AI) all new courses for the B.S. program cover similar topics and are cross-listed with corresponding new courses for the M.S. program.

Due to the similarities between the B.S. and M.S. program proposals, from a library collection perspective it is believed that the conclusions reached in our previous collection evaluation of the M.S. in AI program also apply to the proposed B.S. in AI program. Overall, the library is well-positioned to support the proposed B.S. program; however, a few resources should be added to strengthen the collection in subject areas related to new course offerings. Below is a brief description of the resources currently available, those that should be acquired, and a five-year cost estimate in support of this proposed program.

## Journals and Conference

Currently, the library subscribes to the IEEE Library, which includes all journals, proceedings



# Proceedings

and standards produced by the IEEE. The library also maintains online access to all Association of Computing Machinery (ACM) journals, magazines, transactions and conference proceedings through the ACM Digital Library. The ACM and IEEE digital libraries, along with the library's current subscription to the Springer publisher package, provide full-text access to most of the journal and proceedings literature. Interlibrary loan also provides quick access to any other relevant journal articles. Our review of the major journals (Appendix A) and major proceedings and series (Appendix B) in this subject area lead us to conclude that the library's current holdings of journals and proceedings would provide strong support for the new B.S. program.

## **Indexes**

To access the journal and conference literature in computer science, the University Libraries maintain subscriptions to a number of online indexes. The most important of these are Scopus (an Elsevier product), which indexes journals and conferences across all subjects; Compendex (accessed through Engineering Village), a bibliographic index to journals and conference proceedings in engineering and computing from 1969 to the present; and Science Citation Index (available online through the Web of Science platform), which indexes journals from 1980 to present in the sciences. The library also provides access to Applied Science and Technology Source, which covers both academic and trade journal literature in science and technology. Other important resources include the ACM Digital Library and IEEE Xplor, both of which index journals and conferences published by their respective societies. No additional indexes are needed to support the program adequately.

## **Monographs and Reference Sources**

The library purchases the complete collection of Springer ebooks each year, which includes the essential book series Lecture Notes in Computer Science (and all its subseries) and other book and book series, totaling more than 29,000 volumes related to computer science. Beyond the Springer ebook collection, the library purchases only a minimal number of books related to artificial intelligence and its applications to manufacturing, robotics, or edge computing. Table 1 shows the library's holdings (total, and recently acquired) in the Library of Congress subject classifications most relevant to artificial intelligence, with gaps in the collection relevant to new course offerings highlighted.

To ensure that the Libraries' monographic collection adequately supports the new proposed bachelor's degree program, we recommend the purchase of approximately five eBooks each year in each of the five subject areas highlighted in Table 1; these materials would be selected at a level appropriate for upper division undergraduate use.

Table 1: Monographic titles in subjects relevant to the proposed B.S. in Artificial Intelligence

LC call number	Subject	Number of books owned (all publication years)	Number of books owned (publication 2015-present)
Q325.5 - Q325.787	Cybernetics - Machine learning	477	336
Q334 - Q334.5 Q335 - Q335.7	Artificial intelligence	2550	952
Q334.7	Artificial intelligence - Moral and legal aspects	14	14
Q336	AI - Data processing	44	18
Q337 - Q337.3	Distributed AI	49	36
Q337.5	Pattern recognition systems	163	25
Q342	Computational intelligence	1961	1256
QA76.575	Digital computers - Multimedia systems	303	79
QA76.583	Digital computers - Edge computing	0	0
QA76.585	Digital computers - Cloud computing	257	176
QA76.592	Digital computers - Wearable computers	24	14
QA76.76.E95	Computer software - Expert systems	192	75
QA76.76.I59	Computer software - Interactive media and hypermedia	70	24
QA76.87	Computer science - Neural networks	309	122
QA76.9.A25	Computer science - Computer security	1726	927
QA76.9.A94	Computer science - Augmented reality	21	18
QA76.9.B45	Computer science - Big data	218	196
QA76.9.D343	Computer science - Data mining	616	301
QA76.9.M65	Computer science - Moral and ethical aspects	7	2
QA76.9.S63	Computer science - Soft computing	180	101
T59.6	Information systems - Industry 4.0	7	7
TA347.A78	Artificial intelligence - engineering applications	18	16
TK5105.59	Computer networks - Security measures	220	105
TK5105.8857	Internet of things	123	123
TS155.6 - TS155.67	Production management - Data processing	99	15
Note: Shaded rows indicate subject areas most relevant to new course offerings, and having gaps in the collection.			

# Library Budget Request

Appendices C and D provide cost estimates for resources needed to support the proposed bachelor's level program under two distinct scenarios:

Appendix C applies to the situation in which the proposed B.S. program in artificial intelligence is approved without prior approval of the proposed M.S. program in artificial intelligence. In this case, funding has been requested to:

- purchase approximately five ebooks each year in each of the five subject classifications related to new course content (totaling 25 ebooks per year at an average current cost of \$180), and
- cover anticipated annual inflationary cost increases for the library's current journals and research databases (estimated at ten percent per year) in computer science. Since this program will rely largely on existing library resources, without this funding the library cannot guarantee that it will be able to continue to subscribe to our current resources necessary to support students and faculty in the B.S. in AI program.

Appendix D applies to the alternative situation in which the proposed B.S. program in artificial intelligence is established after approval of the proposed M.S. program in artificial intelligence. In this case, funding has been requested to:

- purchase five ebooks each year in the five subject classifications related to new course content and suitable for undergraduates (totaling 5 ebooks per year at an average current cost \$180).

Since in this case the prior approval of the M.S. in artificial intelligence program is assumed, Appendix D does not include a request for funding of anticipated annual inflationary cost increases for the library's current journals and research databases in support of the B.S. program, as this funding was requested in the 9/15/2022 collection evaluation proposal for the M.S. program.

Appendix A		
Major Journals - Artificial Intelligence		
Title	Publisher	OU Access
ACM Transactions on Intelligent Systems and Technology	ACM	yes
Applied Intelligence	Springer	yes
Applied Soft Computing	Elsevier	via Interlibrary Loan
Artificial Intelligence In Medicine	Elsevier	yes
Artificial Intelligence Review	Springer	yes
Complex & Intelligent Systems	Springer	yes (open access)
Computational Intelligence And Neuroscience	Hindawi	yes (open access)
Engineering Applications of Artificial Intelligence	Elsevier	via Interlibrary Loan
Expert Systems with Applications	Elsevier	via Interlibrary Loan
IEEE Computational Intelligence Magazine	IEEE	yes
IEEE Intelligent Systems	IEEE	yes
IEEE Internet Of Things Journal	IEEE	yes
IEEE Transactions On Cybernetics	IEEE	yes
IEEE Transactions on Emerging Topics in Computational Intelligence	IEEE	yes
IEEE Transactions on Fuzzy Systems	IEEE	yes
IEEE Transactions On Industrial Informatics	IEEE	yes
IEEE Transactions on Neural Networks and Learning Systems	IEEE	yes
IEEE Transactions on Pattern Analysis and Machine Intelligence	IEEE	yes
IEEE Transactions On Systems, Man And Cybernetics Part B, Cybernetics	IEEE	yes
International Journal of Human-Computer Studies	Elsevier	via Interlibrary Loan
International Journal of Intelligent Systems	Wiley	yes
International Journal Of Machine Learning And Cybernetics	Springer Nature	yes
International Journal of Neural Systems	World Scientific	via Interlibrary Loan
Journal Of Biomedical Informatics	Elsevier	yes (12 month embargo)
Journal of Intelligent Manufacturing	Springer	yes
Journal of Machine Learning Research	JMLR	yes (open access)
Knowledge-Based Systems	Elsevier	via Interlibrary Loan
Machine Learning	Springer Nature	yes
Nature Machine Intelligence	NPG	yes (12 month embargo)
Neural Computing and Applications	Springer	yes
Neural Networks	Elsevier	via Interlibrary Loan
Neurocomputing	Elsevier	via Interlibrary Loan
Science And Engineering Ethics	Springer Nature	yes

<b>Appendix B</b>		
<b>Major Conference Proceedings and Series - Artificial Intelligence</b>		
<b>Title</b>	<b>Publisher</b>	<b>OU Access</b>
Advances In Intelligent Systems And Computing	Springer	yes
AAAI Conference on Artificial Intelligence	AAAI	yes (open access)
Conference on Robot Learning (CORL)	MLR Press	yes (open access)
Frontiers In Artificial IntelligenceAnd Applications	105 Press	via Interlibrary Loan
International Conference on Applied Machine Learning (ICAML)	IEEE	yes
International Conference on Artificial Intelligence and Statistics (AISTATS)	MLR Press	yes (open access)
International Conference on Learning Representations (ICLR)	OpenReview	yes (open access)
International Conference on Machine Learning (ICML)	MLR Press	yes (open access]
International Conference on Machine Learning and Applications (ICMLA)	IEEE	yes
International Conference on Machine Learning and Cybernetics (ICMLC)	IEEE	yes
International Joint Conference on Artificial Intelligence (IJCAI)	IJCAI	yes (open access)
Lecture Notes In Artificial Intelligence	Springer	yes
Neural Information Processing Systems (NeurIPS)	ACM	yes (open access)

Appendix C					
Library Budget for Proposed B.S. in Artificial Intelligence Program <sup>3</sup>					
	Year 1	Year 2	Year 3	Year 4	Year 5
Monographs <sup>1,3</sup>	\$ 4,500	\$ 4,860	\$ 5,250	\$ 5,670	\$ 6,124
Support for current resources <sup>2,3</sup>	\$ 5,000	\$ 5,500	\$ 6,050	\$ 6,655	\$ 7,321
<b>Total</b>	<b>\$ 9,500</b>	<b>\$ 10,360</b>	<b>\$ 11,300</b>	<b>\$ 12,325</b>	<b>\$ 13,445</b>

<sup>1</sup>Presumes the purchase of five ebooks each year in each of the five subject classifications related to new course content, with an 8% annual inflationary increase.

<sup>2</sup>Presumes a 10% annual inflation rate.

<sup>3</sup>Presumes that the B.S. in Artificial Intelligence program is approved without prior approval of the M.S. in Artificial Intelligence program.

Appendix D					
Library Budget for Proposed B.S. in Artificial Intelligence Program <sup>2</sup>					
	Year 1	Year 2	Year 3	Year 4	Year 5
Monographs <sup>1,2</sup>	\$ 900	\$ 975	\$ 1,050	\$ 1,135	\$ 1,225
Support for current resources <sup>2</sup>	0	0	0	0	0
<b>Total</b>	<b>\$ 900</b>	<b>\$ 975</b>	<b>\$ 1,050</b>	<b>\$ 1,135</b>	<b>\$ 1,225</b>

<sup>1</sup>Presumes the purchase of five ebooks each year in the five subject classifications related to new course content and suitable for undergraduates, with an 8% annual inflationary increase.

<sup>2</sup>Presumes prior approval of the M.S. in Artificial Intelligence program.

cc: Polly Boruff-Jones, Dean of University Libraries  
 Julia Rodriguez, University Libraries Representative to University Senate

# IMPLEMENTATION PLAN AND TIMELINE

The proposed start of the program is the Fall 2023 semester.

## PROGRAM DELIVERY METHOD

The program will be offered in person only.

If your proposed new program has a delivery method of either fully online (50% or more of the courses have content that is 75% or more online) or blended (50% or more of the courses have content that is 10%-74% online), please contact the e-LIS department before continuing through this process [elis@oakland.edu](mailto:elis@oakland.edu)

I have met with e-LIS prior to completing this proposal:

Yes  
 Not applicable

## ASSESSMENT OF STUDENT LEARNING

The assessment plan was submitted to OIRA and the committee was advised that the documents would be reviewed after the degree proposal is accepted by the School of Engineering and Computer Science. No ABET assessment is required since ABET is expecting to accredit AI undergraduate programs around 2025.



## EXPECTED CAREER OPTIONS FOR GRADUATES

Per the Bureau of Labor and Statistics there is a strong demand for AI engineers and scientists across many industries. Potential employers include:

- Educational Institutions: All universities, high schools, middle schools, and elementary schools
- Government Agencies: State of Michigan, NSA, DoE, DoT, and all other agencies at the county, state, and federal levels
- Military: DoD, Army, Navy, Air Force, and military contractors
- Financial Institutions/Banks and Insurance: Chase, Citi, Bank of America, all local banks in Michigan
- Hospitals and healthcare: William Beaumont Hospital, Crittenton Hospital, St. Joseph Mercy Hospital, Blue Cross Blue Shield of Michigan
- IT companies: Google, Apple, Microsoft, Amazon, eBay, Facebook, Symantec
- All sectors of the computing industry: GM, Stellantis, Ford, DTE, Comcast
- Etc. (AI is almost used in every business domain)

In addition, graduates will have the option of the continuation of studies in Oakland's MS in AI program.

## **EQUIPMENT AND SUPPLIES**

Not applied as we will use existing resources.

# APPENDICES

## Appendix A – Faculty Profiles

Name	Website
Dr. Mehdi Bagherzadeh	<a href="#">Dr. Bagherzadeh's website</a>
Dr. Jingshu Chen	<a href="#">Dr. Chen's website</a>
Dr. Debatosh Debnath	<a href="#">Dr. Debnath's website</a>
Dr. Huirong Fu	<a href="#">Dr. Fu's website</a>
Dr. Marouane Kessentini	<a href="#">Dr. Kessentini's website</a>
Dr. Dae-Kyoo Kim	<a href="#">Dr. Kim's website</a>
Dr. Anyi Liu	<a href="#">Dr. Liu's website</a>
Dr. Lunjin Lu	<a href="#">Dr. Lu's website</a>
Dr. Tianle Ma	<a href="#">Dr. Ma's website</a>
Dr. Khalid Malik	<a href="#">Dr. Malik's website</a>
Dr. Hua Ming	<a href="#">Dr. Ming's website</a>
Dr. Md Atiqul Mollah	<a href="#">Dr. Mollah's website</a>
Dr. Nilesh Patel	<a href="#">Dr. Patel's website</a>
Dr. Guangzhi Qu	<a href="#">Dr. Qu's website</a>
Dr. Sunny Raj	<a href="#">Dr. Raj's website</a>
Dr. Julian Rrushi	<a href="#">Dr. Rrushi's website</a>
Dr. Amartya Sen	<a href="#">Dr. Sen's website</a>
Dr. Ishwar Sethi	<a href="#">Dr. Sethi's website</a>
Dr. Mohammad-Reza Siadat	<a href="#">Dr. Siadat's website</a>
Dr. Gautam Singh	<a href="#">Dr. Singh's website</a>
Dr. Lanyu Xu	<a href="#">Dr. Xu's website</a>
Dr. Douglas Zytko	<a href="#">Dr. Zytko's website</a>

## Appendix B – Sample Plan of Study

Student Schedule - 128 Credits	
<p><b>Fall I - 16 Credits</b>  MTH 1554 - Calculus I (4)  CSI 1420 - Introduction to C Programming and Unix (4)  General education (4)  General education (4)</p>	<p><b>Winter I - 16 Credits</b>  CSI 2300 - Object Oriented Computing (4)  MTH 1555 - Calculus II (4)  Approved science elective with lab (4)  General education (4)</p>
<p><b>Fall II - 16 Credits</b>  Math Elective (4)  CSI 2490 - Introduction to Artificial Intelligence: Representation, Concepts and Problem Solving (4)  General education (4)  CSI 2310 - Data Structures (4)</p>	<p><b>Winter II - 14 Credits</b>  CSI 3370 - Software Engineering and Practice (4)  CSI 3610 - Design and Analysis of Algorithm (4)  CSI 2999 - Sophomore Project (2)  General education (4)</p>
<p><b>Fall III - 16 Credits</b>  Math Elective (4)  CSI 3430 - Theory of Computation (4)  CSI 4130 - Artificial Intelligence (4)  CSI 4810 - Information Retrieval and Knowledge Discovery (4)</p>	<p><b>Winter III - 16 Credits</b>  CSI 4140 - Deep Learning and Applications (4)  CSI 4170 - Ethics and Bias in AI (4)  CSI 4160 - Machine Learning (4)  CSI 4240 - Cloud Computing (4)</p>
<p><b>Fall IV - 18 Credits</b>  CSI 4180 - Natural Language Processing (4)  CSI 4150 - AI for IT Operations (4)  Professional elective (2)  Professional track (4)  Professional elective (2)</p>	<p><b>Winter IV - 12 Credits</b>  CSI 4160 - Foundations of Edge AI (4)  CSI 4230 - Mobile Application Development (4)  CSI 4999 - Senior Capstone Project (4)</p>

## Appendix C - Industry Letters of Support

# CSL Behring

Biotherapies for Life™

October 14, 2022

Letter of Support for the new Bachelor of Science in Artificial Intelligence

I am very excited to support the proposal of the new Bachelor of science in AI at Oakland University. I carefully reviewed the proposal and enjoyed the great discussions around the concentrations of the proposal with other industry leaders of the advisory board.

I found the program very unique as I did not see similar programs in the US with a focus on the Ethics of AI, Edge AI and Embedded AI. Those areas are very important for almost every industry nowadays. I look forward to contributing to the program once it is approved.

Good luck,



John Thompson

Global Head of Advanced Analytics and AI, CSL Behring

[thompsonjohn@cslbehring.com](mailto:thompsonjohn@cslbehring.com)



October 17, 2022

Dear Dr. Kessentini,

I reviewed the proposal of the BSc in AI at Oakland University and I engaged in the advisory board meetings to establish this exciting program.

I strongly support the program since it is really addressing critical needs for the automotive industry especially in Edge AI, Embedded AI and AI Ops. We are really finding a lot of challenges to find qualified engineers in those areas within the state of Michigan. Thus, I am looking forward to seeing this program approved so we can start hiring your graduates as soon as possible based on the huge demand in that area.

All the very best,

A handwritten signature in black ink, appearing to read "Ali Husain".

Ali Husain

Director – Software Research & AI, Ford Motor Co.

[alhusain4@ford.com](mailto:alhusain4@ford.com)



October 19, 2022

To: Dr. Marouane Kessentini, Professor and CSE department chair

Subject: New Bachelor of Science in Artificial Intelligence at Oakland University

I am pleased to advise you that eBay has been in discussion with Dr. Kessentini and the SECS interdisciplinary committee on AI and DS. I attended the advisory board meeting to discuss and review the BSc in AI proposal. I was really very impressed by the quality of the proposal and the great matching with the needs of industry in AI.

eBay is interested in supporting the program should the master proposal is approved Oakland University.

Our intention is to be active partners for this new program. We will encourage several of our engineers and scientists to join our program and I am committed to provide continuous feedback on the program which is very important for us.

We welcome the opportunity to work with you in this exciting new program on the BSc in AI and look forward to continuing and extending our relationship with Oakland University.

Sincerely,

Sami

A handwritten signature in black ink, appearing to read 'Sami', is written over a horizontal line.

Sami Ben Romdhane eBay

VP & Fellow of Platform Architecture and Data Infrastructure 408-759-2081



October 2, 2022

New BSc in AI program at Oakland University: Letter of Support

It is a great pleasure to support this important initiative to establish a Bachelor of science in AI. I reviewed the proposal and participated in the discussions of the courses and concentrations as part of the advisory board. My conclusion is that this program is very much aligned with the industry needs and it will attract a lot of qualified students. IBM signed an agreement with Oakland University to expand AI at your school thus we are fully committed to support your great effort.

Sincerely,

A handwritten signature in black ink, appearing to read 'Seth Dobrin', written over a horizontal line.

Seth Dobrin

Chief AI Officer, IBM

[sdobrin@us.ibm.com](mailto:sdobrin@us.ibm.com)



## Appendix D - Departmental Letters of Support



Department of Industrial and Systems Engineering

10/23/2022

**MEMO**

**To:** Prof. Marouane Kessentini, CSE Dept. Chair

**From:** Prof. Vijitashwa Pandey, ISE Dept. Chair

A handwritten signature in blue ink, appearing to read "Vijitashwa Pandey".

**Subject:** Support letter for BS in Artificial Intelligence

Dear Professor Kessentini,

I am delighted to write this letter of support for the new BS program proposal in Artificial Intelligence. The program includes critical courses from the ISE department and several relevant concentrations to our department such as Augmented and Virtual Reality, and also Smart Manufacturing. It will prepare students in the school for the critical current and future needs of industry located in Michigan, and elsewhere in the United States. I strongly support this program.

Please let me know if I can be of assistance in any way.

---

School of Engineering and Computer Science

Engineering Center, Room 502 | 115 Library Drive, Rochester, Michigan 48309-1179  
(248) 370-2989 | Fax: (248) 370-6625 | oakland.edu/ise



## MEMO

To: Prof. Marouane Kessentini, CSE Dept. Chair  
From: Prof. Osamah Rawashdeh, ECE Dept. Chair *OR*  
Date: 10/24/2022  
Subject: **BS in Artificial Intelligence Proposal Support**

I write in my capacity as the chair of the Electrical and Computer Engineering (ECE) department to express my strong support for the Bachelor of Science in Artificial Intelligence program that you are developing.

The proposed program will provide students with the strong technical skills necessary to engage in ever-growing opportunities in Artificial Intelligence. I particularly appreciate the interdisciplinary approach taken in this proposal. The focus on Embedded AI and on autonomous systems (as two of the concentrations of the program) is of particular interest to students, faculty, and employers on the ECE side.

Please let me know if I can provide any additional support.

# Appendix E - Pro Forma Budget

## SBRC Proforma Template

FY2023

### Most Likely Scenario

	Year 1	Year 2	Year 3	Year 4	Year 5
Est. New Students to Program	20	30	40	50	55
1st Year Cohort Revenue	\$ 341,220	\$ 511,830	\$ 682,440	\$ 853,050	\$ 938,355
2nd Year Cohort Revenue	\$ -	\$ 330,880	\$ 496,320	\$ 661,760	\$ 827,200
3rd Year Cohort Revenue	\$ -	\$ -	\$ 389,280	\$ 583,920	\$ 778,560
4th Year Cohort Revenue	\$ -	\$ -	\$ -	\$ 377,115	\$ 565,673
Gross Tuition Revenue	\$ 341,220	\$ 842,710	\$ 1,568,040	\$ 2,475,845	\$ 3,109,788
Less: Avg Financial Aid (30%)	\$ (102,366)	\$ (252,813)	\$ (470,412)	\$ (742,754)	\$ (932,936)
<b>Net Tuition Revenue</b>	<b>\$ 238,854</b>	<b>\$ 589,897</b>	<b>\$ 1,097,628</b>	<b>\$ 1,733,092</b>	<b>\$ 2,176,851</b>
<b>Expenses</b>					
<b>Salaries</b>					
Faculty Salaries	6101 \$ -	\$ 100,000	\$ 102,500	\$ 105,063	\$ 107,689
Visiting Faculty	6101				
Administrative Professionals	6201				
Clerical Technical	6211				
Administrative IC	6221				
Faculty Inload/Replacement Costs	6301 \$ 28,000	\$ 14,000			
Faculty Overload	6301				
Part-Time Faculty	6301				
Graduate Assistant	6311 \$ 15,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Casual/Temp	6401				
Out of Classification	6401				
Student Labor	6501				
<b>Total Salary Expense</b>	<b>\$ 43,000</b>	<b>\$ 144,000</b>	<b>\$ 132,500</b>	<b>\$ 135,063</b>	<b>\$ 137,689</b>
Fringe Benefits	6701 \$ 3,440	\$ 45,820	\$ 45,758	\$ 46,841	\$ 47,952
<b>Total Compensation</b>	<b>\$ 46,440</b>	<b>\$ 189,820</b>	<b>\$ 178,258</b>	<b>\$ 181,904</b>	<b>\$ 185,642</b>
<b>Operating Expenses</b>					
Supplies and Services	7101				
Graduate Tuition	7101 \$ 12,400	\$ 24,800	\$ 24,800	\$ 24,800	\$ 24,800
E-Learning Support	7102				
Travel	7201				
Equipment	7501				
Maintenance	7110				
Recruitment and advertising	7101 \$ 25,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Library	7401 \$ 9,500	\$ 10,360	\$ 11,300	\$ 12,325	\$ 13,445
<b>Total Operating Expenses</b>	<b>\$ 46,900</b>	<b>\$ 40,160</b>	<b>\$ 41,100</b>	<b>\$ 42,125</b>	<b>\$ 43,245</b>
<b>Total Expenses</b>	<b>\$ 93,340</b>	<b>\$ 229,980</b>	<b>\$ 219,358</b>	<b>\$ 224,029</b>	<b>\$ 228,887</b>
<b>Net Income (Loss)</b>	<b>\$ 247,880</b>	<b>\$ 612,730</b>	<b>\$ 1,348,683</b>	<b>\$ 2,251,816</b>	<b>\$ 2,880,901</b>

<sup>1</sup>The tuition calculations do not account for any attrition of students.

**SBRC Proforma Template**

**FY2023**

**Best-Case Scenario**

		Year 1	Year 2	Year 3	Year 4	Year 5
Est. New Students to Program		30	40	60	80	85
1st Year Cohort Revenue		\$ 511,830	\$ 682,440	\$ 1,023,660	\$ 1,364,880	\$ 1,450,185
2nd Year Cohort Revenue		\$ -	\$ 496,320	\$ 661,760	\$ 992,640	\$ 1,323,520
3rd Year Cohort Revenue		\$ -	\$ -	\$ 583,920	\$ 778,560	\$ 1,167,840
4th Year Cohort Revenue		\$ -	\$ -	\$ -	\$ 565,673	\$ 754,230
Gross Tuition Revenue		\$ 511,830	\$ 1,178,760	\$ 2,269,340	\$ 3,701,753	\$ 4,695,775
Less: Avg Financial Aid (30%)		\$ (153,549)	\$ (353,628)	\$ (680,802)	\$ (1,110,526)	\$ (1,408,733)
<b>Net Tuition Revenue</b>		<b>\$ 358,281</b>	<b>\$ 825,132</b>	<b>\$ 1,588,538</b>	<b>\$ 2,591,227</b>	<b>\$ 3,287,043</b>
<b>Expenses</b>						
<b>Salaries</b>						
Faculty Salaries	6101	\$ -	\$ 100,000	\$ 102,500	\$ 105,063	\$ 107,689
Visiting Faculty	6101					
Administrative Professionals	6201					
Clerical Technical	6211					
Administrative IC	6221					
Faculty Inload/Replacement Costs	6301					
Faculty Overload	6301	\$ 28,000	\$ 14,000			
Part-Time Faculty	6301					
Graduate Assistant	6311	\$ 15,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Casual/Temp	6401					
Out of Classification	6401					
Student Labor	6501					
<b>Total Salary Expense</b>		<b>\$ 43,000</b>	<b>\$ 144,000</b>	<b>\$ 132,500</b>	<b>\$ 135,063</b>	<b>\$ 137,689</b>
Fringe Benefits	6701	\$ 3,440	\$ 45,820	\$ 45,758	\$ 46,841	\$ 47,952
<b>Total Compensation</b>		<b>\$ 46,440</b>	<b>\$ 189,820</b>	<b>\$ 178,258</b>	<b>\$ 181,904</b>	<b>\$ 185,642</b>
<b>Operating Expenses</b>						
Supplies and Services	7101					
Graduate Tuition	7101	\$ 12,400	\$ 24,800	\$ 24,800	\$ 24,800	\$ 24,800
E-Learning Support	7102					
Travel	7201					
Equipment	7501					
Maintenance	7110					
Recruitment and advertising	7101	\$ 25,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Library	7401	\$ 9,500	\$ 10,360	\$ 11,300	\$ 12,325	\$ 13,445
Total Operating Expenses		\$ 46,900	\$ 40,160	\$ 41,100	\$ 42,125	\$ 43,245
<b>Total Expenses</b>		<b>\$ 93,340</b>	<b>\$ 229,980</b>	<b>\$ 219,358</b>	<b>\$ 224,029</b>	<b>\$ 228,887</b>
<b>Net Income (Loss)</b>		<b>\$ 418,490</b>	<b>\$ 948,780</b>	<b>\$ 2,049,983</b>	<b>\$ 3,477,724</b>	<b>\$ 4,466,888</b>

<sup>1</sup>The tuition calculations do not account for any attrition of students.

SBRC Proforma Template						FY2023
Worst-Case Scenario						
		Year 1	Year 2	Year 3	Year 4	Year 5
Est. New Students to Program		15	20	25	30	35
1st Year Cohort Revenue		\$ 255,915	\$ 341,220	\$ 426,525	\$ 511,830	\$ 597,135
2nd Year Cohort Revenue		\$ -	\$ 248,160	\$ 330,880	\$ 413,600	\$ 496,320
3rd Year Cohort Revenue		\$ -	\$ -	\$ 291,960	\$ 389,280	\$ 486,600
4th Year Cohort Revenue		\$ -	\$ -	\$ -	\$ 282,836	\$ 377,115
Gross Tuition Revenue		\$ 255,915	\$ 589,380	\$ 1,049,365	\$ 1,597,546	\$ 1,957,170
Less: Avg Financial Aid (30%)		\$ (76,775)	\$ (176,814)	\$ (314,810)	\$ (479,264)	\$ (587,151)
<b>Net Tuition Revenue</b>		<b>\$ 179,141</b>	<b>\$ 412,566</b>	<b>\$ 734,556</b>	<b>\$ 1,118,282</b>	<b>\$ 1,370,019</b>
<b>Expenses</b>						
<b>Salaries</b>						
Faculty Salaries	6101	\$ -	\$ 100,000	\$ 102,500	\$ 105,063	\$ 107,689
Visiting Faculty	6101					
Administrative Professionals	6201					
Clerical Technical	6211					
Administrative IC	6221					
Faculty Inload/Replacement Costs	6301	\$ 28,000	\$ 14,000			
Faculty Overload	6301					
Part-Time Faculty	6301					
Graduate Assistant	6311	\$ 15,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Casual/Temp	6401					
Out of Classification	6401					
Student Labor	6501					
<b>Total Salary Expense</b>		<b>\$ 43,000</b>	<b>\$ 144,000</b>	<b>\$ 132,500</b>	<b>\$ 135,063</b>	<b>\$ 137,689</b>
Fringe Benefits	6701	\$ 3,440	\$ 45,820	\$ 45,758	\$ 46,841	\$ 47,952
<b>Total Compensation</b>		<b>\$ 46,440</b>	<b>\$ 189,820</b>	<b>\$ 178,258</b>	<b>\$ 181,904</b>	<b>\$ 185,642</b>
<b>Operating Expenses</b>						
Supplies and Services	7101					
Graduate Tuition	7101	\$ 12,400	\$ 24,800	\$ 24,800	\$ 24,800	\$ 24,800
E-Learning Support	7102					
Travel	7201					
Equipment	7501					
Maintenance	7110					
Recruitment and advertising	7101	\$ 25,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Library	7401	\$ 9,500	\$ 10,360	\$ 11,300	\$ 12,325	\$ 13,445
Total Operating Expenses		\$ 46,900	\$ 40,160	\$ 41,100	\$ 42,125	\$ 43,245
<b>Total Expenses</b>		<b>\$ 93,340</b>	<b>\$ 229,980</b>	<b>\$ 219,358</b>	<b>\$ 224,029</b>	<b>\$ 228,887</b>
<b>Net Income (Loss)</b>		<b>\$ 162,575</b>	<b>\$ 359,400</b>	<b>\$ 830,008</b>	<b>\$ 1,373,517</b>	<b>\$ 1,728,283</b>

<sup>1</sup>The tuition calculations do not account for any attrition of students.

- In-state tuition was assumed for all candidates
- One (1) assistant professor will be hired in the 2<sup>nd</sup> year. For details and justification, see staffing needs section.
- One PhD graduate assistant for the first year, two in the remaining years

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## Appendix F – Marketing Documentation

### Market Analysis and Audience

Consider the following:

- What colleges/educational companies currently offer this (or similar) program?
- Are there any programs at OU that are considered to be a competing program?
- What makes this program different from competitor offerings?
- Who is primary audience? Describe the demographics of a student who would be interested in this program and his/her motivation for pursuing the program. What is the desired call to action?
- Who is secondary audience? Consider if any local businesses may be interested in program for employee training. What is the desired call to action?

### Marketing Materials

- Determine contributions of college/unit and what is provided, and if the unit has a marketing coordinator to provide suggested marketing services.
- Create student and faculty stories, including original photoshoots in labs/classrooms. Stories to be used on website, marketing pieces and ad creative
- Write marketing copy to promote program to add to webpage
- Create list of keywords for search engine optimization and use in program information and ads
- Design and print supply of fliers with program details for use at events
- Participate in appropriate academic visit days
- Involve faculty in any available PR/media stories related to program

### Goals/Measurement

- Define goals and timeline. Create and define a strategic call-to-action (request information, apply, visit) to measure interest in program and effectiveness of campaign. Roll-out campaign in phases to maximize exposure, and grow program.

### Paid Media Campaign

- Work with UCM/Brogan to place paid media campaigns in coordination with general OU marketing campaign and/or event marketing, including a mix of social media (Facebook, Instagram, LinkedIn, Reddit, YouTube), search marketing (added to currently running campaign) and digital ad placement (to run on Reddit). Suggested campaign budget of \$25,000 for first year, split into two flights (fall and spring), with supporting campaigns the following years.

### Needs and Costs of the Program

- Marketing Expenses include photography, material printing, media placement and agency fees. Estimated costs \$25,000 first year, plus \$5,000/year for next 3 years of program.

## Appendix G – Transfer Credits from Local Schools

### Bachelor of Science with a major in Artificial Intelligence

#### Major Requirements

Oakland University Courses	Macomb Community College Courses
MTH 1554	MATH 1760
MTH 1555	MATH 1770
APM 2663	MATH 2200
CSI 1420 <b>and</b> CSI 2320 <b>and</b> CSI 3660	ITOS 1710 <b>and</b> ITOS 1720 <b>and</b> ITCS 2530 (all three courses required)
CSI 2300	ITCS 2590
CIS 2460	AUTO 2600 <b>or</b> ITIA 1310 <b>and</b> ITIA 2800
CSI 2470	ITNT 1500 <b>and</b> 2130
CSI 3450	ITCS 1170

Students may transfer an unlimited amount of credit from MCC, and must complete a minimum of 45 credit hours from OU to meet degree requirements. As programs may limit how much transfer credit can be used toward requirements, **it is highly recommended that students work with both an OU academic adviser and their MCC counselor to maximize the applicability of coursework to specific requirements.**

#### **TRANSFERRING WITH THE MICHIGAN TRANSFER AGREEMENT (MTA):**

When choosing to complete MTA to satisfy General Education, please confirm the best courses to take to fulfill the agreement with your academic adviser at MCC or at the [MCC MTA Approved Courses](#) website. Completing MTA when following this major guide will satisfy OU's transferable General Education requirements.

#### **Additional course requirements for MTA when following this major guide**

##### **(minimum 30 credit hours required for MTA):**

ENGL 1180 or 1210 **and** ENGL 1190 or 1220 (Review your MTA plans with an OU academic adviser)

Two MTA Approved Natural Sciences courses

Two MTA Approved Social Sciences courses

Two MTA Approved Humanities or Fine Arts courses

#### **TRANSFERRING WITHOUT MTA:**

If you intend to transfer without MTA, you can choose to complete additional coursework to fulfill OU's individual General Education categories instead. When following this major guide, please reference the [MCC General Education Transfer Guide](#) for the MCC courses that satisfy these specific OU General Education categories:

- Writing Foundations (ENGL 1190 or 1220)
- Arts
- Language and Culture
- Global Perspective
- Literature
- Natural Science & Technology
- Social Science
- U.S. Diversity

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All prospective students should call the School of Engineering and Computer Science (SECS) Academic Advising Office at (248) 370-2201 to schedule an appointment. Their office can also be contacted by email at [secsadvising@oakland.edu](mailto:secsadvising@oakland.edu), or visit their [website](#) for more information. \_\_\_\_\_



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## **NOTES:**

Transfer students are admitted directly to the major if they have a cumulative GPA of 2.8 or higher, if students have a GPA between 2.5 and 2.79, they are admitted as a "Candidate" to the SECS, and will need to meet established criteria to change their major.

Students apply for major standing once they have completed math, science, and core computer science courses.

Oakland University will always honor the **MACRAO transfer agreement** and apply it to the General Education requirement the same as MTA.

## **TALKING POINTS:**

Learn more about OU's [ABET accredited programs](#): (Mechanical Engineering, Computer Engineering, Electrical Engineering, Industrial & Systems Engineering, Information Technology and Computer Science).

Learn about ways to [get involved](#) in over 20 student organizations affiliated with SECS, as well as different professional organizations related to careers in engineering and computer science!

OU students also participate in competitions such as Intelligent Ground Vehicle, [Formula SAE](#), North American International Auto Show in Detroit, GrizzHacks, and Maker Faire Detroit.

OU offers a number of [scholarship opportunities](#) to students in the School of Engineering and Computer Science to help pay for your education.

The School of Engineering and Computer Science offers a wide variety of [opportunities for undergraduate research](#).

SECS students can work with a career consultant about your resume, job search or to practice your interviewing skills. There are also a number of networking events each month and [resources available through Career Services](#). Employers from hundreds of companies participate in our annual Engineering and IT Career Fair in search of Oakland students to fill internship and full-time opportunities. 85% of SECS graduates from July 2019 to June 2020 completed an internship or internship-like experience.

Oakland University was [designated as a National Center of Academic Excellence in Cyber Defense Education \(CAECDE\)](#) in 2018.

MCC students considering transferring to SECS are encouraged to consider our [HTech Jobs of the Future](#) partnership program, to provide students the support, direction and guidance needed to achieve your academic goals.

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## Appendix H – Syllabi from new Artificial Intelligence Courses

### CSI 2490 – Introduction to AI Course Syllabus

**Catalog Description:** This is an introductory course to artificial intelligence that covers fundamental topics in AI, including search, reasoning, knowledge representation, and planning. The goal of this course is to provide an overview of the artificial intelligence field. Through lectures, discussions, and homework assignments, students will learn basic AI concepts and principles.

**Prerequisite:** CSI1320 or CSI1420.

#### Learning Objectives:

- Participate in the design of systems that act intelligently and learn from experience.
- Identify problems where artificial intelligence techniques are applicable
- Apply selected basic AI techniques; judge applicability of more advanced techniques.

#### Required Textbooks and Materials

Russell, S. & Norvig, P. Artificial Intelligence: A Modern Approach, Pearson, 2020

#### Exams:

Two exams, a midterm and a final exam, will be given. The midterm exam will cover material from the first six weeks of the semester, and the final will cover material exams after the midterm. Exams are open-book, open-notes.

#### Course grade Criteria:

- 70% (700 points) — Assignments and labs (Best 7 will be counted out of 8 for final grade)
- 15% (150 points) — Midterm Exam
- 15% (150 points) — Final Exam

Points	Percentage	Grade
931-1000	93.1%-100%	A
890-930	89.1%-93%	A-
851-890	85.1%-89%	B+
801-850	80.1%-85%	B
751-800	75.1%-80%	B-
701-750	70.1%-75%	C+
651-700	65.1%-70%	C
601-650	60.1%-65%	C-
551-600	55.1%-60%	D+
501-550	50.1%-55%	D
0-500	0%-50%	F

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## CSI 4110 - Foundations of Edge AI (4) Course Syllabus

**Catalog Description:** The course covers many topics including the importance of power efficiency, latency, and bandwidth considerations for AI/ML implementation on edge devices. The course will cover how computing can be distributed between the edge devices and the cloud. Cross-listed with CSI5110.

Prerequisite: Major Standing.

### Learning Objectives:

After completing the course, students should be able to:

- Identify different components of IoT
- Select development boards and tool chains for application prototyping
- Program MCU and SoC to read sensor data and control actuators
- Analyze sensor data using machine learning tools
- Use TensorFlow Lite to deploy neural networks on capable MCUs

**Required Textbooks and Materials** TinyML by Pete Warden and Daniel Situnayake, O'Reilly, 2019

### Grading:

**Homework:** Six homework assignments will be given and completed by students working in groups of two. Assignments will cover the core areas of intrusion detection, malware classification, or network analysis, and will utilize the skills discussed in the lectures.

**Project:** There will be a semester long project to be completed by students working in groups of 4. A list of potential project topics will be provided, or students may choose their own (with instructor approval).

### Course grade Criteria:

- 60% (600 points) — Assignments and labs
- 40% (400 points) — Project

Points	Percentage	Grade
951-1000	95.1%-100%	A
901-950	90.1%-95%	A-
851-900	85.1%-90%	B+
801-850	80.1%-85%	B
751-800	75.1%-80%	B-
701-750	70.1%-75%	C+
651-700	65.1%-70%	C
601-650	60.1%-65%	C-
551-600	55.1%-60%	D+

501-550	50.1%-55%	D
0-500	0%-50%	F

**CSI 4150 - AI for IT Operations (4)  
Course Syllabus**

**Catalog Description:** This course introduces participants to MLOps tools and best practices for deploying, evaluating, monitoring and operating production ML systems on the Cloud. MLOps is a discipline focused on the deployment, testing, monitoring, and automation of ML systems in production. Cross-listed with CSI5150.

**Prerequisites:** Major standing.

**Learning Objectives:**

- How to reduce the risk of entering bias in our artificial intelligence solutions and how to approach explainable AI (XAI)
- The importance of efficient and reproduceable data pipelines, including how to manage your company's data
- An operational perspective on the development of AI models using the MLOps (Machine Learning Operations) approach, including how to deploy, run and monitor models and ML pipelines in production using CI/CD/CT techniques, that generates value in the real world
- Key competences and toolsets in AI development, deployment and operations

**Required Textbooks and Materials:** Operating AI: Bridging the Gap Between Technology and Business 1st Edition by Ulrika Jagare

**Grading:**

Labs: Eight Hands-on labs will be assigned throughout the semester.

Project: There will be two semester long projects to be completed by students working in groups of 2. A list of potential project topics will be provided, or students may choose their own (with instructor approval).

**Course grade Criteria:**

- 10% (100 points) — Reading Assignments
- 40% (400 points) — Labs
- 25% (250 points) — Project 1
- 25% (250 points) — Project 2

Points	Percentage	Grade
951-1000	95.1%-100%	A

901-950	90.1%-95%	A-
851-900	85.1%-90%	B+
801-850	80.1%-85%	B
751-800	75.1%-80%	B-
701-750	70.1%-75%	C+
651-700	65.1%-70%	C
601-650	60.1%-65%	C-
551-600	55.1%-60%	D+
501-550	50.1%-55%	D
0-500	0%-50%	F

### **CSI 4100 – Ethics and Bias in AI Course Syllabus**

**Catalog Description:** In this course students will acquire the tools to critically think, read, and write about AI in sociotechnical contexts. They will master the vocabulary and concepts necessary to identify, interrogate, and plan for the ethical implications of AI as a technological, social, and cultural phenomenon. Cross-listed with CSI5170.

**Prerequisites:** Major standing.

#### **Learning Objectives:**

Students will be able to understand

- the power and impact that analytics and AI/ML have on individuals and society, especially concerning issues such as fairness and bias, ethics, legality, data collection and public use.
- the underlying components of big data, apply basic statistical techniques to data scenarios, and understand the issues faced when learning from big data, ranging from data biases, overfitting, causation vs correlation, etc.
- basic AI/ML techniques to data scenarios, with a focus on identifying fairness and bias issues found in the design of decision-making systems.

**Required Textbooks and Materials:** Ethics of Artificial Intelligence 1st Edition  
by S. Matthew Liao

#### **Grading:**

**Homework:** Ten homework assignments will be given and completed by students working in groups of two. Assignments will cover the core areas of intrusion detection, malware classification, or network analysis, and will utilize the skills discussed in the lectures.

**Project:** There will be a semester long project to be completed by students working in groups of 4. A list of potential project topics will be provided, or students may choose their own (with instructor approval).

#### **Course grade Criteria:**

- 60% (600 points) — Assignments and labs
- 20% (200 points) — Project 1
- 20% (200 points) — Project 2

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<b>Points</b>	<b>Percentage</b>	<b>Grade</b>
951-1000	95.1%-100%	A
901-950	90.1%-95%	A-
851-900	85.1%-90%	B+
801-850	80.1%-85%	B
751-800	75.1%-80%	B-
701-750	70.1%-75%	C+
651-700	65.1%-70%	C
601-650	60.1%-65%	C-
551-600	55.1%-60%	D+
501-550	50.1%-55%	D
0-500	0%-50%	F

**SBRC Proforma Template**

**FY2024**

**Most Likely Scenario**

	Year 1	Year 2	Year 3	Year 4	Year 5
Est. New Students to Program	20	30	40	50	55
1st Year Cohort Revenue	\$ 341,220	\$ 511,830	\$ 682,440	\$ 853,050	\$ 938,355
2nd Year Cohort Revenue	\$ -	\$ 330,880	\$ 496,320	\$ 661,760	\$ 827,200
3rd Year Cohort Revenue	\$ -	\$ -	\$ 389,280	\$ 583,920	\$ 778,560
4th Year Cohort Revenue	\$ -	\$ -	\$ -	\$ 377,115	\$ 565,673
Gross Tuition Revenue	\$ 341,220	\$ 842,710	\$ 1,568,040	\$ 2,475,845	\$ 3,109,788
Less: Avg Financial Aid (30%)	\$ (102,366)	\$ (252,813)	\$ (470,412)	\$ (742,754)	\$ (932,936)
<b>Net Tuition Revenue</b>	<b>\$ 238,854</b>	<b>\$ 589,897</b>	<b>\$ 1,097,628</b>	<b>\$ 1,733,092</b>	<b>\$ 2,176,851</b>
<b>Expenses</b>					
<b>Salaries</b>					
Faculty Salaries	6101 \$ -	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Visiting Faculty	6101				
Administrative Professionals	6201				
Clerical Technical	6211				
Administrative IC	6221				
Faculty Inload/Replacement Costs	6301 \$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000
Faculty Overload	6301				
Part-Time Faculty	6301				
Graduate Assistant	6311 \$ 15,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Casual/Temp	6401				
Out of Classification	6401				
Student Labor	6501				
<b>Total Salary Expense</b>	<b>\$ 23,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>
Fringe Benefits	6701 \$ 1,840	\$ 45,340	\$ 45,340	\$ 45,340	\$ 45,340
<b>Total Compensation</b>	<b>\$ 24,840</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>
<b>Operating Expenses</b>					
Supplies and Services	7101 \$ 15,000	\$ 15,000	\$ 10,000	\$ 10,000	\$ 10,000
Graduate Tuition	7101 \$ 12,400	\$ 24,800	\$ 24,800	\$ 24,800	\$ 24,800
E-Learning Support	7102				
Travel	7201 \$ 10,000	\$ 10,000	\$ 5,000	\$ 5,000	\$ 5,000
Equipment	7501				
Maintenance	7110				
Recruitment and advertising	7101 \$ 25,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Library	7401 \$ 900	\$ 975	\$ 1,050	\$ 1,135	\$ 1,225
<b>Total Operating Expenses</b>	<b>\$ 63,300</b>	<b>\$ 55,775</b>	<b>\$ 45,850</b>	<b>\$ 45,935</b>	<b>\$ 46,025</b>
<b>Total Expenses</b>	<b>\$ 88,140</b>	<b>\$ 239,115</b>	<b>\$ 229,190</b>	<b>\$ 229,275</b>	<b>\$ 229,365</b>
<b>Net Income (Loss)</b>	<b>\$ 150,714</b>	<b>\$ 350,782</b>	<b>\$ 868,438</b>	<b>\$ 1,503,817</b>	<b>\$ 1,947,486</b>

# SBRC Proforma Template

FY2024

## Best-Case Scenario

	Year 1	Year 2	Year 3	Year 4	Year 5
Est. New Students to Program	30	40	60	80	85
1st Year Cohort Revenue	\$ 511,830	\$ 682,440	\$ 1,023,660	\$ 1,364,880	\$ 1,450,185
2nd Year Cohort Revenue	\$ -	\$ 496,320	\$ 661,760	\$ 992,640	\$ 1,323,520
3rd Year Cohort Revenue	\$ -	\$ -	\$ 583,920	\$ 778,560	\$ 1,167,840
4th Year Cohort Revenue	\$ -	\$ -	\$ -	\$ 565,673	\$ 754,230
Gross Tuition Revenue	\$ 511,830	\$ 1,178,760	\$ 2,269,340	\$ 3,701,753	\$ 4,695,775
Less: Avg Financial Aid (30%)	\$ (153,549)	\$ (353,628)	\$ (680,802)	\$ (1,110,526)	\$ (1,408,733)
<b>Net Tuition Revenue</b>	<b>\$ 358,281</b>	<b>\$ 825,132</b>	<b>\$ 1,588,538</b>	<b>\$ 2,591,227</b>	<b>\$ 3,287,043</b>
<b>Expenses</b>					
<b>Salaries</b>					
Faculty Salaries	6101 \$ -	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Visiting Faculty	6101				
Administrative Professionals	6201				
Clerical Technical	6211				
Administrative IC	6221				
Faculty Inload/Replacement Costs	6301				
Faculty Overload	6301 \$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000
Part-Time Faculty	6301				
Graduate Assistant	6311 \$ 15,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Casual/Temp	6401				
Out of Classification	6401				
Student Labor	6501				
<b>Total Salary Expense</b>	<b>\$ 23,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>
Fringe Benefits	6701 \$ 1,840	\$ 45,340	\$ 45,340	\$ 45,340	\$ 45,340
<b>Total Compensation</b>	<b>\$ 24,840</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>
<b>Operating Expenses</b>					
Supplies and Services	7101 \$ 15,000	\$ 15,000	\$ 10,000	\$ 10,000	\$ 10,000
Graduate Tuition	7101 \$ 12,400	\$ 24,800	\$ 24,800	\$ 24,800	\$ 24,800
E-Learning Support	7102				
Travel	7201 \$ 10,000	\$ 10,000	\$ 5,000	\$ 5,000	\$ 5,000
Equipment	7501				
Maintenance	7110				
Recruitment and advertising	7101 \$ 25,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Library	7401 \$ 900	\$ 975	\$ 1,050	\$ 1,135	\$ 1,225
Total Operating Expenses	\$ 63,300	\$ 55,775	\$ 45,850	\$ 45,935	\$ 46,025
<b>Total Expenses</b>	<b>\$ 88,140</b>	<b>\$ 239,115</b>	<b>\$ 229,190</b>	<b>\$ 229,275</b>	<b>\$ 229,365</b>
<b>Net Income (Loss)</b>	<b>\$ 270,141</b>	<b>\$ 586,017</b>	<b>\$ 1,359,348</b>	<b>\$ 2,361,952</b>	<b>\$ 3,057,678</b>



# SBRC Proforma Template

FY2024

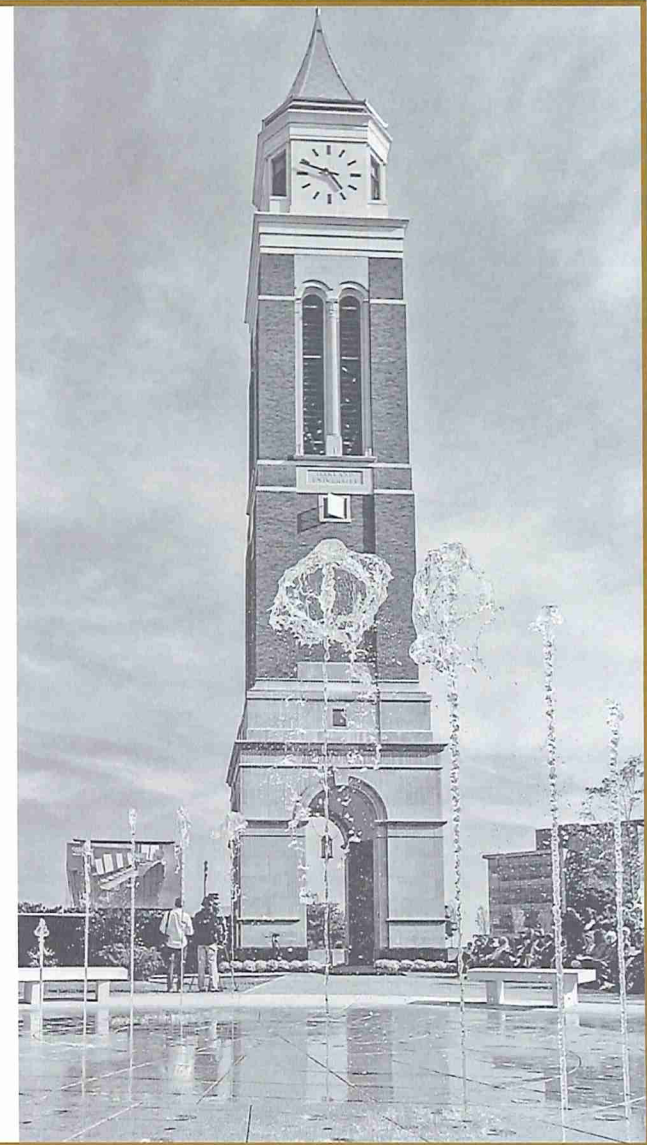
**Worst-Case Scenario**

	Year 1	Year 2	Year 3	Year 4	Year 5
Est. New Students to Program	15	20	25	30	35
1st Year Cohort Revenue	\$ 255,915	\$ 341,220	\$ 426,525	\$ 511,830	\$ 597,135
2nd Year Cohort Revenue	\$ -	\$ 248,160	\$ 330,880	\$ 413,600	\$ 496,320
3rd Year Cohort Revenue	\$ -	\$ -	\$ 291,960	\$ 389,280	\$ 486,600
4th Year Cohort Revenue	\$ -	\$ -	\$ -	\$ 282,836	\$ 377,115
Gross Tuition Revenue	\$ 255,915	\$ 589,380	\$ 1,049,365	\$ 1,597,546	\$ 1,957,170
Less: Avg Financial Aid (30%)	\$ (76,775)	\$ (176,814)	\$ (314,810)	\$ (479,264)	\$ (587,151)
<b>Net Tuition Revenue</b>	<b>\$ 179,141</b>	<b>\$ 412,566</b>	<b>\$ 734,556</b>	<b>\$ 1,118,282</b>	<b>\$ 1,370,019</b>
<b>Expenses</b>					
<b>Salaries</b>					
Faculty Salaries	6101 \$ -	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Visiting Faculty	6101				
Administrative Professionals	6201				
Clerical Technical	6211				
Administrative IC	6221				
Faculty Inload/Replacement Costs	6301 \$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000
Faculty Overload	6301				
Part-Time Faculty	6301				
Graduate Assistant	6311 \$ 15,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Casual/Temp	6401				
Out of Classification	6401				
Student Labor	6501				
<b>Total Salary Expense</b>	<b>\$ 23,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>	<b>\$ 138,000</b>
Fringe Benefits	6701 \$ 1,840	\$ 45,340	\$ 45,340	\$ 45,340	\$ 45,340
<b>Total Compensation</b>	<b>\$ 24,840</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>	<b>\$ 183,340</b>
<b>Operating Expenses</b>					
Supplies and Services	7101 \$ 15,000	\$ 15,000	\$ 10,000	\$ 10,000	\$ 10,000
Graduate Tuition	7101 \$ 12,400	\$ 24,800	\$ 24,800	\$ 24,800	\$ 24,800
E-Learning Support	7102				
Travel	7201 \$ 10,000	\$ 10,000	\$ 5,000	\$ 5,000	\$ 5,000
Equipment	7501				
Maintenance	7110				
Recruitment and advertising	7101 \$ 25,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Library	7401 \$ 900	\$ 975	\$ 1,050	\$ 1,135	\$ 1,225
Total Operating Expenses	\$ 63,300	\$ 55,775	\$ 45,850	\$ 45,935	\$ 46,025
<b>Total Expenses</b>	<b>\$ 88,140</b>	<b>\$ 239,115</b>	<b>\$ 229,190</b>	<b>\$ 229,275</b>	<b>\$ 229,365</b>
<b>Net Income (Loss)</b>	<b>\$ 91,001</b>	<b>\$ 173,451</b>	<b>\$ 505,366</b>	<b>\$ 889,007</b>	<b>\$ 1,140,654</b>

# Bachelor of Science in Artificial Intelligence

*Proposed by:*

*Department of Computer Science and Engineering (CSE),  
School of Engineering and Computer Science*



# Rationale

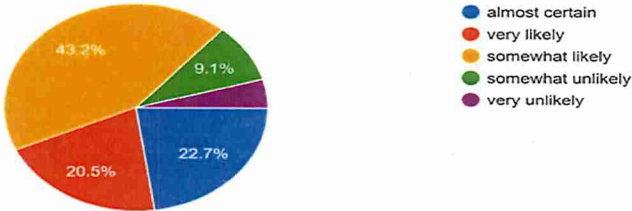
## Wanted: Artificial intelligence experts

In artificial intelligence, job openings are rising faster than job seekers.



- 59% of organizations in the US named “the shortage of AI talents” as the primary barrier to realizing value from their AI technologies (Bureau of Labor and Statistics survey)

Q2. Rate the likelihood of submitting an application for admission to the proposed program if it were launched within the next 1-2 years? (almost c...somewhat likely, somewhat unlikely, very unlikely)

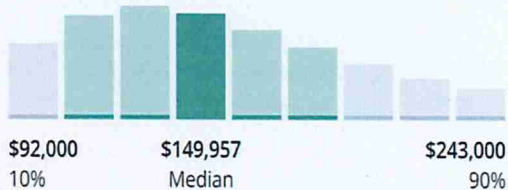


## Average Artificial Intelligence Specialist Salary In Rochester, MI

**\$149,957** yearly ⓘ

\$72.09 hourly

Entry level Salary  
\$92,000 yearly



# Proposed Curriculum Design

## Artificial Intelligence Core [18 credits]

- CSI 1420 - Introduction to C Programming and Unix (4) Or CSI 1320 - Introduction to Python Programming and Unix (4)
- CSI 2300 - Object-Oriented Computing (4)
- CSI 2310 - Data Structures (4)
- CSI 2490 - Introduction to Artificial Intelligence: Representation, Concepts and Problem Solving (4)
- CSI 2999 – Sophomore Project (2)

## Required professional subjects [44 credits]

- CSI 3370 - Software Engineering and Practice (4)
- CSI 3610 - Design and Analysis of Algorithm (4)
- CSI 3430 - Theory of Computation (4)
- CSI 4130 - Artificial Intelligence (4)
- CSI 4810 - Information Retrieval and Knowledge Discovery (4)
- CSI 4140 - Deep Learning and Applications (4)
- CSI 4100 - Ethics and Bias in AI (4)
- CSI 4170 - Machine Learning (4)
- CSI 4180 - Natural Language Processing (4)
- CSI 4150 - AI for IT Operations (4)
- CSI 4999 - Senior Capstone Project (4)

## Depth areas/ Professional track [12 credits]

Select one of the following professional tracks

- A) Edge AI and IoT Track
- CSI 4110 - Foundations of Edge AI (4)
  - CSI 4230 - Mobile Application Development (4)
  - CSI 4240 - Cloud Computing (4)

B) Embedded AI Track

- ECE 4731 - Fundamentals of Embedded System (4)
- ECE 4900 - ST: Embedded Artificial Intelligence (4)

Choose one from following courses:

- ECE 4520 - Automotive Mechatronics I (4)
- CSI 4110 - Foundations of Edge AI (4)

C) Human-Centered AI and Robotics Track

- CSI 4800 - AI-Human Interaction (4)

Choose two from following courses:

- CSI 3500 - Human Computer Interaction (4)
- CSI 4550 - Visual Computing (4)
- ECE 4510 - Machine Vision (4)
- ECE 4551 - Human-Robot Interaction (4)
- ECE 4500 - Robotic Systems and Control (4)
- ISE 4422 - Robotic Systems (4)
- ISE 4900 - ST: Automotive User Experience (4) (We'll have to use the title as stated in the catalog only; ISE 4900 - Special Topics (2 to 4))
- ISE 4441 - Human Factors Engineering (4)

D) AI for Cyber Security and Trustworthy AI Track

- CSI 4580 - AI for Cybersecurity and Privacy (4)

Choose two from following courses:

- CSI 4370 - Software Verification and Testing (4)
- CSI 4700 - Software Security (4)
- CSI 4560 - Mobile Security (4)
- CSI 4790 - Automotive Security (4)
- CSI 4520 - Industrial Control Security (4)
- ECE 4780 - Embedded Security (4)

E) Augmented/Virtual Reality Track

- ISE 4900 - ST: Virtual and Augmented Reality (4) (We'll have to use the title as stated in the catalog only; ISE 4900 - Special Topics (2 to 4))
- CSI 4550 - Visual Computing (4)

Choose one from following courses:

- ISE 4900 - ST: Automotive User Experience (4) (We'll have to use the title as stated in the catalog only; ISE 4900 - Special Topics (2 to 4))
- CSI 3380 - Game Design (4)
- CSI 4380 - Game Programming (4)
- ECE 4510 - Machine Vision (4)

F) Smart Manufacturing and Industry 4.0 Track

Choose three from following courses:

- ISE 4410 - Supply Chain Modeling and Analysis (4)
- ISE 4423 - Industrial Automation Systems (4)
- ISE 4435 - Data Analytics
- ISE 4900 - ST: Virtual and Augmented Reality (4) (We'll have to use the title as stated in the catalog only; ISE 4900 - Special Topics (2 to 4))
- ISE 4900 - ST: Automotive User Experience (4) (We'll have to use the title as stated in the catalog only; ISE 4900 - Special Topics (2 to 4))
- CSI 4800 - AI-Human Interaction (4)

- ECE 4551 - Human-Robot Interaction (4)

## Professional Electives [6 credits]

2 Credits of the following 2000 level courses:

- CSI 2320 - C++ for Programmers (2)
- CSI 2330 - Immersive Python (2)
- CSI 2340 - Ruby for Web Developers (2)
- CSI 2350 - Programming in Visual C# for .NET Technology (2)

And: 4 credits from one of these options:

- Any class in one of the depth areas not chosen as a primary specialty
- Courses at the 5000 level, with instructor approval.
- Any 3000 or 4000 level class in Engineering, Computer Science, or Mathematics not currently part of the AI curriculum.

The total credits for the proposed degree are 128 units.