BOARD APPROVED
October 2, 2020
Janice Indrutz
Corporate Secretary

PURDUE UNIVERSITY BOARD OF TRUSTEES
EXECUTIVE SUMMARY DEGREE PROPOSAL TEMPLATE

PLEASE NOTE THAT THE FULL PROPOSAL CHECKLIST WILL NEED TO BE COMPLETED FOR THE INDIANA COMMISSION ON HIGHER EDUCATION (see https://in.gov/che/files/checklist_of_criteria_web.pdf)
Both this template and the full checklist document are submitted to the Purdue Board of Trustees.
When this form is complete, please save and return to weiderhaft@purdue.edu with tables as separate attachment.

DATE:
TO: Board of Trustees
FROM: Brian King, Primary Contact, (317) 274-9723; briking@iupui.edu
CC: Mohammad Hasan, Secondary Contact, (317) 274-3862; alhasan@iupui.edu
SUBJECT: Bachelor of Science in Artificial Intelligence

CAMPUS OFFERING DEGREE: IUPUI

ANTICIPATED START DATE: Fall 2021

1. IS THE DEGREE RESIDENTIAL, HYBRID, OR ONLINE?
IF ONLINE, RATIONALE FOR GOING THROUGH SPECIFIC PURDUE CAMPUS—PWL, PFW, PNW, PG

Residential

2. BRIEF OVERVIEW OF DEGREE/WHY IS THE DEGREE NEEDED?

We prose a Bachelor of Science in Artificial Intelligence degree. It will be a BS Purdue degree to be offered by both the School of Engineering & Technology and School of Science at Indiana University Purdue University Indianapolis. Parallel to this BS degree, the School of Informatics and Computing is developing a BA degree in Artificial Intelligence at IUPUI.

The degree is targeted towards students who are interested in a curriculum that has artificial intelligence theory, methodologies, and applications infused throughout the program. It will also target students who are interested in applications that are reliant on artificial intelligence technologies, such as robotics, autonomous systems, intelligent control and smart systems and devices.

There will be two concentrations in the Bachelor of Science in Artificial Intelligence: 1) “Data & Computational Science” concentration offered by School of Science; 2) “Intelligent Control & Systems” concentration offered by School of Engineering & Technology. To summarize we propose:

Degree: Bachelor of Science in Artificial Intelligence

Concentration	School offering concentration
Data & Computational Science	School of Science
Intelligent Control & Systems	School of Engineering & Technology

Artificial Intelligence, aka machine intelligence, is concerned with the understanding and development of intelligent software and hardware systems. While the area has existed for more than 30 years and emerged from interdisciplinary research in computer science, neuroscience, and electrical engineering, it was limited until the past ten years by the limited availability of requisite computing power. The recent widespread applications utilizing machine learning and data mining were made due to the availability of this necessary computing power. As a result, AI applications are now available in multitude of fields such as automation/autonomy, manufacturing, transportation, health, security and others. Future trends will likely include plug-in AI computer chips that can be added to various devices/systems enabling greater intelligent capabilities in said devices/systems.

The proposed BS in Artificial Intelligence supports IUPUI's mission to advance the State of Indiana and the intellectual growth of its citizens to the highest levels nationally and internationally. Further, it supports

the recently announced IUPUI research focus in Artificial Intelligence. On April 30th, 2020, IUPUI announced a new research institute in Artificial Intelligence[1]. Lastly, it supports the campus priority of advancing technologies that impact health and life sciences, as well as other campus initiatives.

As for impacts to the state, this degree program will increase the number of professionals trained to work in the area of Artificial Intelligence, machine learning and data analytics. Such technologies have been utilized by numerous state industries ranging from defense, medicine, automotive and manufacturing. The goal is to create a better prepared workforce for future needs.

This BS in AI degree program will provide a solid foundational, as well as comprehensive education on AI and related technologies. Students graduating from this program will be able to develop intelligent agents that are part of autonomous systems mimicking human behavior capable of performing tasks autonomously, and intelligently. Development of real-life agents requires two complementary skills: first, perception, learning algorithms, and intelligent decision making from data, and the second skill is using the intelligence to control hardware or software in an application field for performing autonomous actions. Students pursing the "Data & Computational Science" concentration will focus on theory and algorithms for learning, data analysis, optimization, and decision making, whereas, students in the "Intelligent Control & Systems" will focus on embedded systems, autonomous systems, optimization methods for systems and control, smart device and systems, and system security. The first concentration will prepare AI scientists with strong AI software development capability, the second concentration will prepare AI engineers with ability to integrate AI technologies to application fields, such as, autonomous transportation, cybersecurity, and Internet of things. Overall, these concentrations complement each other in terms of curricula and career opportunity.

[1]https://news.iu.edu/stories/2020/04/iupui/releases/30-new-artificial-intelligence-institute-launched.html

3. BRIEF EVIDENCE OF FEDERAL, STATE, AND REGIONAL LABOR MARKET NEED

i) National, State, or Regional Need

There have been numerous studies on the impact of automation on the job market. Clearly, as society increasingly turns towards automation, there will be job loss in certain occupations and growth in others. The knowledge provided by this degree addresses the technologies that will be in great demand and workers trained in such technologies will be in great demand. This demand will occur in all areas-central Indiana, Indiana, and nationally.

ii) Preparation for Graduate Programs or Other Benefits

The graduates of this degree program will be well prepared with a strong mathematical foundation, strong programing foundation, and deep understanding of artificial intelligence and related technologies. They will be well prepared for any graduate programs in the computing area, and depending on the concentration, prepared for graduate electrical engineering programs.

iii) Summary of Indiana Department of Workforce Development and/or U.S. Department of Labor Data

From the US Bureau of Labor Statistics, they reported that the position Computer and Information Research Scientists, a job title which implies training in machine learning and databases, as an occupation that should grow 16% increase from 2018 to 2028.

iv) National, State, or Regional Studies

A 2018 Ernst & Young poll found that 84% of surveyed CEOs said that AI will play an important role in the success of their businesses. A 2017 Ernst & Young survey7 reported that 56% of senior artificial intelligence experts believe that the lack of skilled professionals will impact implementation of these techniques across all sectors. Thus we may currently have huge demand but lack prepared workers.

4. COSTS

A. Tuition and Fees—In-state and out-of-state

In-State Tuition (full-time): $4,397.39
Out-of-State Tuition (full-time): $15,238.45
Fees (15 credit hours): $1320.61

B. Financial Projection Table
https://www.purdue.edu/provost/policies/iche.html (Tab 1)

C. Program Review and Expenditure Summary
https://www.purdue.edu/provost/policies/iche.html (Tab 2)

D. Enrollment Projection
https://www.purdue.edu/provost/policies/iche.html (Tab 3)

5. LIST OF SIMILAR DEGREES IN THE PURDUE SYSTEM AND DISTINCTIVE ELEMENTS FOR THIS DEGREE

There are many BS computer science programs in Indiana for which a student can create an emphasis in artificial intelligence and machine learning by taking the appropriate electives. However, at this time, there is no bachelor's degree in artificial intelligence.

There are existing BS computing degree programs on the IUPUI campus. They are Computer Science, Computer Engineering, Informatics and Computer Information Technology programs. These programs and many of their courses support the proposed degree. In parallel with this proposal, the IUPUI School of Informatics and Computing is proposing a BA in AI.

6. COMPETITIVE DEGREES – BRIEF SUMMARY

There is a BS degree in Artificial Intelligence at Carnegie Mellon University. There is also a BS degree in Artificial Intelligence at Illinois Institute of Technology. There are several BS in artificial intelligence degrees outside the US. There are numerous computer science programs with artificial intelligence tracks, emphasis or specializations.

Recommended Approval:

9/8/20

Jay T. Akridge — Date
Provost and Executive Vice President for
Academic Affairs and Diversity

Approved:

9/9/20

Mitchell E. Daniels, Jr. — Date
President

Table 2
Program Revenue and Expenditure Summary
Board of Trustees Table
Purdue Indianapolis Campus (IUPUI)
BS Degree in Artificial Intelligence

	Year #1 FY 2021	Year #2 FY 2022	Year #3 FY 2023	Year #4 FY 2024	Year #5 FY 2025
Total Incremental Revenue*	$ 109,912	$ 224,820	$ 449,640	$ 659,472	$ 799,360
Total Expenditures	$ -	$ -	$ -	$ -	$ -
Projected Program Surplus/(Deficit)**	**$ 109,912**	**$ 224,820**	**$ 449,640**	**$ 659,472**	**$ 799,360**

*Based on the anticipated number of ***new*** students to campus; transfers or existing students are not included. Projected incremental revenue is based on the current ***full-time, resident*** tuition and fees approved by the Bursar.

**Projected surplus/deficit is an aid to identify potential new University revenue, anticipated program costs, and degree substantiality. This does not represent any type of funding request.

Additional Departmental Footnotes:

Program will be supported using existing faculty and resources. No additional expenditures anticipated.

Table 3
Projected Headcount and FTE Enrollment and Degrees Conferred
Board of Trustees & ICHE Table
Purdue Indianapolis Campus (IUPUI)
BS Degree in Artificial Intelligence

	Year #1 FY 2021	Year # 2 FY 2022	Year # 3 FY 2023	Year # 4 FY 2024	Year # 5 FY 2025
Enrollment Projections (Headcount)	**30**	**60**	**115**	**160**	**200**
Enrollment Projections (FTE)	**26**	**52**	**104**	**147**	**176**
Degree Completions Projection	**0**	**0**	**0**	**43**	**50**