

REVISIONS TO DISCIPLINES LIST FORM

Artificial Intelligence

(Note: Only typed forms will be accepted.)

DATE SUBMITTED: September 25, 2023

DISCIPLINES LIST TITLE: Artificial Intelligence (AI)

This proposal is for a New discipline
 Revision to existing discipline

Reason for the proposal Create a new discipline
 Update language in existing discipline to reflect new terminology
 Make minimum qualifications in existing discipline more restrictive
 Make minimum qualifications in existing discipline less restrictive

PROPOSAL LANGUAGE: (If this is an existing minimum qualification, please include the original language and change using strikeouts and *italics*).

Four (4) years of occupational experience in Artificial Intelligence/Machine Learning and a Bachelor's degree in Artificial Intelligence, Computer Science (CS), Electrical Engineering and Computer Science (EECS), Mathematics, or Data Science.

OR

A Master's degree in Artificial Intelligence/Machine Learning, Computer Science (CS), or Electrical Engineering and Computer Science (EECS).

OR

A Master's degree in any field with 18 graduate credits in Artificial Intelligence/Machine Learning.

PROPOSAL EVIDENCE:

Any Disciplines List proposal must have the following evidence, which is essential because it provides the rationale about why the change is needed as well as inform the field that the research has been completed to ensure that the change is necessary. A lack of documentation about the need of Discipline List Revision may cause the proposal to be delayed or rejected by the Executive Committee. Please use the following check list to ensure all you have conducted all necessary research.

Required investigation of the following and statement of findings:

Contacted an associated professional organization to determine support of proposal

Letters of Support have been requested and are forthcoming from the university, colleges, industry partners, and organizations.

Attached are ten (10) letters of support from universities, community colleges, industry partners, and personal endorsement from the North and Far North Regional Consortium.

California State University

- San Jose State University

California Community Colleges

- Santa Ana College
- Mission College
- Evergreen Valley College
- San Mateo College
- Folsom Lake College

Employers & Industry Organizations and Personal

- Intel Corp.
- Amazon Web Services (AWS)
- Sustainable Living Lab
- Personal Endorsement — North and Far North Regional Consortium

- Included evidence of degrees within the proposed revision of the discipline or new discipline.

At this time of this application:

- There are no associate degrees in AI in the California Community Colleges (CCC) system.
- There are no Bachelor's degrees in AI in the CCC system.
- There are no Bachelor's degrees in AI in the California State University (CSU) system.
- There are no Bachelor's degrees in AI in the California University (UC) system.
- There are Master's degrees in various AI areas in the UC and CSU systems.

- Provided a list of the titles of the degrees and programs to document the need for a new or revised discipline using the below criteria:

- Minimum of three degrees
- Regionally accredited institutions (all public institutions in California)
- Disciplines in the Master's List requires evidence of the availability of master's degrees

The listing of evidence to support the AI degrees and programs from colleges and universities is given below.

- There are no Artificial Intelligence (AI) degrees in the CCC system listed in the current Minimum Qualifications Handbook (17th Edition, June 2022).
- There are no Bachelor's degrees in AI from public universities across California.
- Master's Degrees in AI and Machine Learning (ML) — CSU System:
 - California State University - San Francisco —
Master of Science in Data Science and Artificial Intelligence
 - California State University - San Jose —
Masters of Science in Artificial Intelligence

- California State University - Los Angeles —
Master's in Computer Science – Artificial Intelligence Research Path
- Master's Degrees in AI and Machine Learning (ML) — UC System:
 - UC Santa Cruz — Master of Science Program in Natural Language Processing
 - UC Los Angeles — Master of Engineering in Artificial Intelligence
 - UC Riverside — Master's in Robotics – Artificial Intelligence and Perception

- ☒ Provided statewide need documented by evidence to show a change is necessary and not merely a response to a unique need of one college, district or region. Demonstrated a balance of need across the state and included a discipline seconder from another district.

At the time of this application, no associate degree program in Artificial Intelligence (AI) exists within the California Community Colleges (CCC) system. Through collaboration and outreach, four (4) colleges are working to establish their AI Associate Degrees in the coming months — Laney College, Mission College, Santa Ana College, and Folsom Lake College. However, there are ongoing efforts to create AI courses and programs at numerous community colleges to address the growing demand for AI skills in response to the rapid advancement of AI technologies and the shortage of a skilled AI workforce — Las Positas College, Foothill College, San Francisco City College, etc.

According to the Bay Area LMI Center of Excellence, "*Based on all available data, there appears to be an "undersupply" of Artificial Intelligence workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda, Contra Costa counties). There is a projected annual gap of about 20,197 students in the Bay region and 2,250 students in the East Bay Sub-Region.*" — Attachment: LMI data on AI Occupations, February 2023.

These AI curriculum developments are taking place across California, encompassing institutions in the Southern regions, such as Santa Ana College and LA Southwest, and the Northern and Bay areas, including Laney College, Mission College, Las Positas College, and Folsom Lake College. These current AI programs and developments have led to this AI Discipline proposal, which has garnered support from community colleges throughout the State (letters of support from five (5) colleges), university (letter of support from Cal State San Jose), industry partners (letters of support from Intel, AWS, and Sustainable Living Lab), and personal endorsement from Director Wendy Porter from the North and Far-North Regional Consortium.

Community colleges are actively working to create AI-focused curricula, with various forms of developmental support available from key industry players like Intel and Amazon Web Services (AWS). Additionally, online training resources such as DeepLearning.ai and Coursera have contributed to the successful development of new AI courses and specializations.

The proposed AI minimum qualifications are well-founded through working collaboration with the training curricula provided by Intel (Ai4Workforce) and AWS (Machine Learning University Enablement Program), both of which offer industry-specific AI and Machine Learning (ML) courses and programs to ensure the workforce is well-prepared for the demands of the AI industry. Actively, Intel and AWS are working with faculty members to further AI curriculum

offerings across California and the country, and their AI curriculum and training have successfully helped launch programs at Miami Dade College in Florida, Houston Community College in Texas, and Maricopa Community Colleges in Arizona.

Notably, Miami Dade Community College in Florida received approval to offer the first Bachelor of Science in Applied Artificial Intelligence (AI) beginning in 2024, Houston Community College offers a Bachelor of Applied Technology in Artificial Intelligence and Robotics, and Chandler Gilbert Community College plans offering their Bachelor in Artificial Intelligence in 2025.

- ☒ Explained the impact of proposal across the state using a list the pro and con arguments and including refutation of the con arguments

Pros:

Unity and Codification: The proposal aims to unify and codify all advancements in Artificial Intelligence (AI) and Machine Learning (ML) into a distinct discipline. This effort will provide guidance and clarity for the content of AI-related courses, programs, certificates, and degrees.

Clear Employer Expectations: By implementing this proposal, employers will realize and gain a clear understanding of the training and skills that our students receive. This transparency will be beneficial as job descriptions increasingly require expertise in AI, and our students will hold certificates and degrees specifically in AI.

Cons:

Perceived Educational Hurdles: Some may argue that the AI job market has created the perception that prospective employees should possess a Master's or Ph.D. degree in AI fields.

Perceived Cross-Department and TOP Code Hurdles: Some may argue the AI program should be housed within other departments and use an existing TOP Code.

Refutation:

- Perceived Educational Hurdles

The AI discipline proposal addresses this concern by bringing clarity and standardization to our AI course offerings. Community college faculty are actively engaged in training programs provided by key industry leaders and promote AI-based curricula development in collaboration with organizations like Intel and AWS. These collaborations demonstrate that AI employment does not necessarily mandate a Master's or Ph.D. degree. Instead, the emphasis is on gaining practical and industry-relevant skills through our proposed AI curriculum and ensuring students are well-prepared for the workforce without unnecessary extensive postgraduate education.

Even with smaller percentages, from the February 2023 LMI report by the San Francisco Center of Excellence on the education requirements for AI occupations in the Bay

Region, 814 job postings require High School or GED, and 2227 job postings require an Associate degree. We can now see the numbers opening up with the job positions without Master's and Ph.D. degrees.

- Perceived Cross-Department and TOP Code Hurdles

The current AI curricula and programs have been developed and housed under different departments, for example, CS, CIS, CISB, CISD, CISP, CMPR, ENGIN, and MATH. Students and employers need clarification of the nature of the AI courses offered in non-AI departments. Housing under various departments would also affect the ability to use specific budget codes and AI-specific grant applications.

A standalone CTE TOP code can catalyze the development of comprehensive and structured AI curricula. This CTE TOP code benefits students and faculty members because of a clear roadmap for course offerings, listings, prerequisites, and program requirements. It also encourages institutions to invest in faculty development and resources to support AI education. AI is a rapidly evolving field with new technologies and techniques emerging regularly, and having a dedicated TOP code allows institutions to adapt their AI programs quickly by having the budget to incorporate the latest advancements and respond to changing industry needs.

Provided other evidence such as significant changes to the field that requires a change to the Disciplines List.

In the current California Community Colleges system, Laney College and five (5) other colleges have established formal programs and training initiatives in Artificial Intelligence (AI) fields. These colleges are actively providing courses and training opportunities to equip our students with the skills required to meet the workforce demands in this rapidly evolving field. AI encompasses various domains and specializations, for example, machine learning, natural language processing, computer vision, robotics, ethics in AI, data science, healthcare, art, music, and more. These AI areas are currently under development, and we are eager to address them comprehensively to benefit our communities.

Furthermore, it is worth highlighting that in addition to industry demand, AI technology and its applications, such as ChatGPT, Bard, Claude 2, and Dalle-3, have revolutionized teaching methods and pedagogical approaches, necessitating the integration process of various AI tools into the classroom environment.

The advancement of AI represents a significant and transformative force in today's world. Even with concerns of AI causing employment issues (for example, recent WGA/SAG and UAW strikes) and ChatGPT presenting a disruptive change in education, AI still poises to remain pivotal in the foreseeable future. The continuous progress in AI technology and development has catalyzed a multitude of applications across diverse industries, ranging from healthcare to finance, manufacturing to entertainment, and from K-14 education to universities. This progress of AI has also led to a growing consensus that there is a shortage of professionals skilled in AI, with projections indicating a substantial demand for new jobs and upskilled workers in the coming years — See June 28, 2023 news analysis at <https://www.computerworld.com/article/3700857/ai-will-kill-these-jobs-but-create-new->

[ones-too.html](#), and July 26, 2023 report at <https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america>.

The influence of AI technologies and applications has extended globally, prompting governments to commission studies on AI societal implications. Notably, the White House issued directives with the “Blueprint for an AI Bill of Rights” in October 2022 (<https://www.whitehouse.gov/wp-content/uploads/2022/10/Blueprint-for-an-AI-Bill-of-Rights.pdf>), and currently in Congress, there are calls to pass the "Creating Resources for Every American To Experiment with Artificial Intelligence Act" (CREATE AI Act introduced in July 2023), which “establishes the National Artificial Intelligence Research Resource (NAIRR) as a shared national research infrastructure that provides AI researchers and students with greater access to the complex resources, data, and tools needed to develop safe and trustworthy artificial intelligence.” (https://eshoo.house.gov/sites/evo-subsites/eshoo.house.gov/files/evo-media-document/eshoo_043_xml.pdf).

On September 6, 2023, the State of California issued an Executive Order on AI to provide further understanding and actions. Significantly, it confirms: 1) California is home to 35 of the world’s top 50 AI companies, and 2) San Francisco and San Jose are dominating this AI technological revolution with AI patents, conference papers, and companies. The Executive Order action includes, among others, “*State agencies and departments subject to my authority shall support California's state government workforce and prepare for the next generation of skills needed to thrive in the GenAI economy ...*” (<https://www.gov.ca.gov/wp-content/uploads/2023/09/AI-EO-No.12--GGN-Signed.pdf>).

While the United States has adopted the Classification of Instructional Programs (CIP) code 11.0102 for "Artificial Intelligence and Robotics", the California Community College system currently lacks a dedicated AI-relevant Taxonomy of Programs (TOP) code. Instead, various TOP codes encompassing computer science, programming, and related technologies are in place.

These underscore the urgency and relevance of developing a comprehensive AI discipline within our educational system to equip students with the skills and knowledge necessary for success in this dynamic AI field.

- Provided a ½ page written rationale to be included in public documents.

Besides Laney College, there are five (5) community colleges across California developing and offering significant AI courses and programs (<https://www.regionalcte.org/browse?region=region&status=status&search=artificial+intelligence&submit=>). Moreover, more colleges are contemplating the development of their own AI programs. These newly established AI courses have used various department codes, including CS, CIS, CISB, CISD, CISP, CMPR, ENGIN, and MATH.

It is noteworthy that, presently, the California Community College system lacks a dedicated AI-relevant Taxonomy of Programs (TOP) code. Laney College has initiated the process to address this gap by applying for a new AI discipline with the proposed CTE TOP code 0729.00.

In May 2023, Laney College received state approvals for its first four (4) new AI courses. Continuing through the summer, we have developed additional AI courses to enable the offerings of Certificates of Achievement in three (3) areas: 1) Deep Learning, 2) Natural Language Processing, and 3) Computer Vision, plus an Associate degree in Artificial Intelligence (AI).

Since spring 2022, to gain industry AI skills, Laney College faculty members have received training with Intel's Ai4Workforce curriculum taught by Sustainable Living Lab (SL2) (www.sustainablelivinglab.org), AWS Machine Learning University (MLU) Enablement Program taught by The Coding School (www.the-cs.org), AWS Academy AI/ML courses, and online course "AI for Everyone" offered by DeepLearning.ai & Coursera.com (<https://www.coursera.org/learn/ai-for-everyone>).

To achieve statewide coverage for the AI Discipline proposal, Laney College has garnered support from Santa Ana College and Folsom Lake College for a new AI discipline application and its associated CTE TOP code. Laney College has also received support from institutions and leadership such as California State University at San Jose, Mission College, Evergreen Valley College, San Mateo College, Employer Partnerships Director at the North and Far North Regional Consortium, and from key industry leaders Intel, AWS, and Sustainable Living Lab (SL²).

Establishing a new CTE TOP code of 0729.00 specifically for AI will formalize the AI discipline and promote further advancements in AI-related programs across California community colleges. We kindly request your support and consideration for the approval and adoption of the AI discipline proposed by Laney College. This proposal not only positions California at the forefront of AI workforce preparation on a national scale but also equips California Community Colleges with the means to develop their own AI programs, contributing to the growth and enhancement of our State's technological ecosystem.

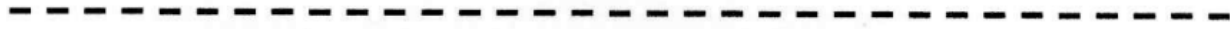
We genuinely appreciate your time and consideration in this matter.

SUBMISSION

Once a proposal is received by the Senate Office, it is reviewed by staff to ensure that all the information is complete and includes the revision, contact information, appropriate signatures and rationale. The Senate Office will also check to ensure that the proposal has not previously been considered and rejected by the delegates at a plenary session or, if it has, it is supported by a new rationale. The proposal is then sent to the S&P Chair to review the Senate Office information and to ensure that the proposal meets the initial requirements of the Disciplines List review process as well as to verify that the proposal is not being submitted to deal with a district-specific problem that does not apply broadly. If there are any concerns with the proposal, the S&P Chair, working with the S&P Committee, will immediately follow up with the initiator.

The contact person (or a designee) will be required to attend hearings where the proposal is presented. These hearings are typically held at the ASCCC plenary sessions. It should be noted that the contact person is responsible for investigating and documenting the need for changes to the Discipline List.

Please reference the Disciplines List Handbook for information about the process including the role of the initiator, the Standards and Practices Committee, the Executive Committee, and the delegates. This handbook can be found on our website at <http://asccc.org/disciplines-list>.



Contact person (author of proposal)

- Tuan Nguyen (Faculty, Laney College, Peralta Community College District)
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Seconded (must be from another District):

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Signature of College Academic Senate President¹ Leslie Mackenzie Blackie
 College Laney
 Email lblackie@peralta.edu Date approved by College Academic Senate 9/12/23

OR

Organization _____
 President _____
 Date Approved by Organization _____ Phone for President _____

RETURN FORM TO: The Academic Senate for California Community Colleges
 One Capitol Mall, Suite 230, Sacramento, CA 95814
 Email: disciplineslist@asccc.org

¹ By signing this document, the Senate President is certifying that the required investigation and statement of findings have been sufficiently addressed.

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Signature of College Academic Senate President¹ _____

College _____

Email _____ Date approved by College Academic Senate _____

OR

Organization _____

President _____

Date Approved by Organization _____ Phone for President _____

RETURN FORM TO:

The Academic Senate for California Community Colleges
One Capitol Mall, Suite 230, Sacramento, CA 95814
Email: disciplineslist@asccc.org

¹ By signing this document, the Senate President is certifying that the required investigation and statement of findings have been sufficiently addressed.



Labor Market Analysis for Program Recommendation Artificial Intelligence Occupations Laney College

Prepared by the San Francisco Bay Center of Excellence for Labor Market Research

February 2023

Recommendation

Based on all available data, there appears to be an “undersupply” of Artificial Intelligence workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda, Contra Costa counties). There is a projected annual gap of about 20,197 students in the Bay region and 2,250 students in the East Bay Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0799.00 Other Information Technology programs in the state and region. It is recommended that these data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at Laney College and in the region.

This report profiles Artificial Intelligence Occupations in the 12 county Bay region and in the East Bay sub-region for a proposed new program at Laney College.

- **Computer and Information Systems Managers (11-3021):** Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming. Excludes “Computer Occupations” (15-1111 through 15-1199).
Entry-Level Educational Requirement: Bachelor’s degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%
- **Software Developers (15-1252):** Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.
Entry-Level Educational Requirement: Bachelor’s degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 11%
- **Data Scientists (15-2051):** Develop and implement a set of techniques or analytics applications to transform raw data into meaningful information using data-oriented programming languages and visualization software. Apply data mining, data modeling, natural language processing, and machine learning to extract and analyze information from large structured and unstructured datasets. Visualize, interpret, and report data findings.

May create dynamic data reports.

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Percentage of Community College Award Holders or Some Postsecondary Coursework: 11%

Occupational Demand

Table 1. Employment Outlook for Artificial Intelligence Occupations in Bay Region

Occupation	2021 Jobs	2026 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Computer and Information Systems Managers	47,580	50,330	2,750	6%	20,825	4,165	\$79	\$101
Software Developers	136,241	158,805	22,564	17%	75,436	15,087	\$62	\$79
Data Scientists	8,882	10,341	1,459	16%	4,804	961	\$60	\$77
Total	192,703	219,476	26,773	14%	101,064	20,213		

Source: Lightcast 2022.3

Bay Region includes: Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

Table 2. Employment Outlook for Artificial Intelligence Occupations in East Bay Sub-region

Occupation	2021 Jobs	2026 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Computer and Information Systems Managers	8,045	7,902	-143	-2%	2,918	584	\$70	\$88
Software Developers	17,365	18,526	1,160	7%	7,602	1,520	\$55	\$70
Data Scientists	1,648	1,780	132	8%	729	146	\$53	\$68
Total	27,059	28,208	1,149	4%	11,250	2,250		

Source: Lightcast 2022.3

East Bay Sub-Region includes: Alameda, Contra Costa Counties

Job Postings in Bay Region and East Bay Sub-Region

Table 3. Number of Job Postings by Occupation for latest 12 months (Feb. 2022 - Jan. 2023)

Occupation	Bay Region	East Bay
Software Developers	98,936	14,842
Data Scientists	18,738	2,754
Computer and Information Systems Managers	2,723	463

Source: Lightcast

**Table 4a. Top Job Titles for Artificial Intelligence Occupations for latest 12 months (Feb. 2022 - Jan. 2023)
Bay Region**

Title	Bay	Title	Bay
Software Engineers	10,327	Full Stack Developers	1,497
DevOps Engineers	3,316	Software Developers	1,427

Title	Bay	Title	Bay
Data Scientists	3,102	Machine Learning Engineers	1,249
Full Stack Software Engineers	2,540	Full Stack Engineers	1,236
Java Developers	2,292	Android Developers	1,220
Data Analysts	2,290	Platform Software Engineers	1,203
Principal Software Engineers	1,657	Salesforce Developers	1,189
Staff Software Engineers	1,541	Software Development Engineers	1,104
Back End Software Engineers	1,516	Lead Software Engineers	1,081

Source: Lightcast

**Table 4b. Top Job Titles for Artificial Intelligence Occupations for latest 12 months (Feb. 2022 - Jan. 2023)
East Bay Sub-Region**

Title	East Bay	Title	East Bay
Software Engineers	1,617	Lead Software Engineers	202
DevOps Engineers	534	Principal Software Engineers	189
Java Developers	515	Embedded Software Engineers	186
Data Analysts	392	Security Software Engineers	179
Full Stack Software Engineers	379	Android Developers	171
Data Scientists	343	Salesforce Developers	154
Software Developers	339	Software Development Engineers	148
Full Stack Developers	294	Full Stack Java Developers	145
.NET Developers	220	Application Engineers	143

Source: Lightcast

Industry Concentration

Table 5. Industries hiring Artificial Intelligence Workers in Bay Region

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2021)	Jobs in Industry (2026)	% Change (2021-26)	% Occupation Group in Industry (2022)
Custom Computer Programming Services	37,729	45,020	19%	20%
Internet Publishing and Broadcasting and Web Search Portals	26,184	32,281	23%	13%
Software Publishers	24,001	28,026	17%	12%
Computer Systems Design Services	20,260	22,147	9%	10%

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2021)	Jobs in Industry (2026)	% Change (2021-26)	% Occupation Group in Industry (2022)
Electronic Computer Manufacturing	10,959	12,767	16%	6%
Data Processing, Hosting, and Related Services	8,673	12,162	40%	5%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	5,278	6,510	23%	3%
Corporate, Subsidiary, and Regional Managing Offices	5,580	5,464	-2%	3%
Other Computer Related Services	4,640	5,410	17%	2%
Research and Development in Biotechnology (except Nanobiotechnology)	3,071	4,189	36%	2%

Source: Lightcast 2022.3

Table 6. Top Employers Posting Artificial Intelligence Occupations in Bay Region and East Bay Sub-Region (Feb. 2022 - Jan. 2023)

Employer	Bay	Employer	East Bay
Jobot	2,581	Lucid Motors	750
Uber	1,823	Revature	576
Randstad	1,428	Workday	482
Apple	1,413	Robert Half	290
Motion Recruitment	1,304	Wells Fargo	267
Revature	1,301	Albertsons	205
Amazon	1,263	Jobot	200
Google	1,203	Kforce	156
Cynet Systems	1,116	Randstad	142
Lucid Motors	1,074	Siemens	135

Source: Lightcast

Educational Supply

There is one (1) community college in the Bay Region issuing 16 awards on average annually (last 3 years ending 2018-19) on TOP 0799.00 Other Information Technology. In the East Bay Sub-Region, there are no community colleges that issued awards on average annually (last 3 years) on this TOP code.

Table 7. Community College Awards on TOP 0799.00 - Other Information Technology in Bay Region

College	Subregion	Low unit Certificate	Total
Santa Rosa	North Bay	16	16
Total		16	16

College	Subregion	Low unit Certificate	Total
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Source: Data Mart

Note: The annual average for awards is 2017-18 to 2019-20.

Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 20,213 annual openings for the Artificial Intelligence occupational cluster and 16 annual (3-year average) awards for an annual undersupply of 20,197 students. In the East Bay Sub-Region, there is also a gap with 2,250 annual openings and no annual (3-year average) awards for an annual undersupply of 2,250 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0799.00 - Other Information Technology

Metric Outcomes	Bay All CTE Programs	Laney All CTE Program	State 0799.00	Bay 0799.00	East Bay 0799.00	Laney 0799.00
Students with a Job Closely Related to Their Field of Study	74%	73%	71%	78%	N/A	N/A
Median Annual Earnings for SWP Exiting Students	\$48,926	\$41,990	\$43,308	\$43,704	\$33,638	N/A
Median Change in Earnings for SWP Exiting Students	23%	15%	13%	18%	18%	N/A
Exiting Students Who Attained the Living Wage	50%	48%	56%	46%	44%	N/A

Source: Launchboard Strong Workforce Program Median of 2018 to 2021.

Skills, Certifications and Education

Table 9. Top Skills for Artificial Intelligence Occupations in Bay Region (Feb. 2022 - Jan. 2023)

Skill	Posting	Skill	Posting
Computer Science	46,901	Application Programming Interface (API)	21,883
Software Engineering	43,349	C++ (Programming Language)	19,177
Python	41,166	Automation	18,119
Java	39,012	Debugging	17,891
Software Development	29,768	Machine Learning	15,420
SQL	29,040	Docker (Software)	15,296
Amazon Web Services	23,153	Algorithms	15,254
JavaScript	23,089	Linux	14,806
Agile Methodology	22,999	Git (Version Control System)	14,482

Skill	Posting	Skill	Posting
Scalability	22,827	Kubernetes	13,786

Source: Lightcast

Table 10. Certifications for Artificial Intelligence Occupations in Bay Region (Feb. 2022 - Jan. 2023)

Certification	Posting	Certification	Posting
Software Development Engineer in Test	1,229	Secret Clearance	235
Master Of Business Administration (MBA)	1,159	Functional Skills Qualification	221
Security Clearance	1,141	Salesforce Certified Platform Developer I	205
Certified Power Quality Professional	822	Salesforce Certified Platform Developer II	198
Enterprise Desktop Administrator (Microsoft Certified IT Professional)	675	Microsoft Certified Professional	164
Salesforce Certification	594	Cisco Certified Network Associate	160
Top Secret-Sensitive Compartmented Information (TS/SCI Clearance)	317	American Medical Billing Association	143
Salesforce Certified Administrator	299	ITIL Certifications	140
Certified Information Systems Security Professional	278	GIAC Certifications	137
Project Management Professional Certification	275	CompTIA Security+	132

Source: Lightcast

Table 11. Education Requirements for Artificial Intelligence Occupations in Bay Region

Education Level	Job Postings	% of Total
High school or GED	814	1%
Associate degree	2,227	2%
Bachelor's degree & higher	103,713	97%

Source: Lightcast

Note: 42% of records have been excluded because they do not include a degree level. As a result, the chart above may not be representative of the full sample.

Methodology

Occupations for this report were identified by use of job descriptions and skills listed in O*Net. Labor demand data is sourced from Lightcast occupation and job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CCCCO Data Mart and CTE Launchboard.

Sources

O*Net Online
Lightcast

CTE LaunchBoard www.calpassplus.org

Launchboard

Statewide CTE Outcomes Survey

Employment Development Department Unemployment Insurance Dataset

Living Insight Center for Community Economic Development

Chancellor's Office MIS system

Contacts

For more information, please contact:

- Leila Jamoosian, Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (COE), leila@baccc.net
- John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, jcarrese@ccsf.edu or (415) 267-6544



August 29, 2023

Tuan Nguyen
Professor of Computer Information System
Laney College
900 Fallon St
Oakland, CA 94607

Subject: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Mr. Nguyen,

I hope this letter finds you well. I am writing to express my strong support for the inclusion of a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum. As a supportive member of the academic community, I believe that recognizing AI as a distinct discipline is of paramount importance to adequately unify and prepare our students for the rapidly evolving technological landscape and to foster innovation within our state.

Artificial Intelligence has emerged as a transformative force across various sectors, from healthcare to finance, manufacturing to entertainment, and beyond. It plays a pivotal role in driving technological advancements, shaping industries, and reshaping the way we interact with the world around us. Given the profound impact AI technologies are having on society, it is crucial that our education system adapts accordingly.

By introducing a dedicated discipline for AI within the TOP codes, California would be taking a significant step towards ensuring that our students receive comprehensive and specialized education in this critical field. This initiative would encompass a wide range of subjects, including machine learning, natural language processing, computer vision, robotics, ethics in AI, data science, and more. It would equip students with the skills and knowledge necessary to not only harness the potential of AI but also to address the ethical, social, and economic challenges it presents.

Furthermore, the addition of a new discipline for AI in the TOP codes would reinforce California's position as a global leader in technology and innovation. It would attract top talent, encourage interdisciplinary collaboration, and foster partnerships between academia, industry, and government. As AI becomes increasingly intertwined with various aspects of our lives,

WHERE TODAY'S STUDENTS MEET TOMORROW'S OPPORTUNITY.



having a dedicated discipline will allow us to cultivate a workforce that is well-prepared to lead and drive advancements in this dynamic field.

Mission College is also developing our own Artificial Intelligence and Machine Learning Certificate of Achievement and Associate of Science degree program with close collaboration with Laney College's Computer Information System department and Intel Corp. Having distinct TOP codes for this discipline will help us to recruit students as well as work with industry partners for potential summer internship and future full employment utilizing the AI skills in the workforce.

In conclusion, I wholeheartedly endorse the proposal to introduce a new discipline for Artificial Intelligence within the TOP codes. This strategic move would not only benefit our students but also contribute to the growth and vitality of the state's technological ecosystem. I encourage the State of California Academic Senate to carefully consider this proposition and take decisive action to ensure that our educational institutions are at the forefront of AI education.

Thank you for your time and attention to this matter. I am confident that your thoughtful consideration will lead to positive outcomes for the future of education and innovation in our state. Should you require any further information or support, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Clement S. Lam".

Clement S. Lam, Ph.D.
Dean of STEM
Email: clement.lam@missioncollege.edu
Phone: 408.855.5332

Santa Ana College



Jason Sim
Santa Ana College
530 W 17th St, Santa Ana, CA 92706
Sim_Jason@sac.edu
(714) 564-6000
9/3/2023

Tuan Nguyen
Professor of Computer Information Systems
Laney College
900 Fallon St
Oakland, CA 94607

Subject: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

I am writing to express my enthusiastic support for the continued development and adoption of Artificial Intelligence (AI) technologies. As someone who closely follows advancements in the field of AI and recognizes its profound potential, I believe that AI has the capacity to revolutionize various aspects of our society, economy, and daily lives in overwhelmingly positive ways.

AI is poised to drive innovation across numerous industries, from healthcare and finance to transportation and education. It has the potential to significantly enhance efficiency, productivity, and decision-making processes, ultimately benefiting individuals and organizations alike. With AI's ability to analyze vast datasets, recognize patterns, and make predictions, it can empower professionals to make more informed decisions, find new solutions to complex problems, and uncover insights that were previously hidden.

Furthermore, AI can play a critical role in addressing some of the most pressing global challenges, including climate change, public health crises, and cybersecurity threats. Its applications in data analysis, modeling, and simulation can aid in devising sustainable solutions and improving our preparedness and response to crises.

AI can also contribute to creating a more inclusive and equitable society. By automating routine tasks and reducing bias in decision-making processes, AI has the potential to increase economic opportunities and bridge gaps in access to resources and services. However, it is crucial that AI development and deployment prioritize fairness, transparency, and ethical considerations to ensure that these benefits are realized by all segments of society.

Santa Ana College



Moreover, the advancement of AI can stimulate economic growth and job creation. While some traditional job roles may evolve or become automated, new opportunities will emerge in AI development, data science, ethics, and governance. Investing in AI education and workforce development is essential to ensure that individuals can participate in the AI-driven economy.

As we move forward with AI development, it is essential that we do so responsibly and with a focus on ethical considerations. This includes addressing concerns related to data privacy, security, accountability, and bias mitigation. Collaboration between industry, academia, government, and civil society is crucial to establishing guidelines and regulations that strike a balance between innovation and protection.

In conclusion, I strongly endorse the proposal to introduce a new discipline for AI within the TOP codes.

Thank you for your attention to this critical matter. I look forward to witnessing the positive impact of AI on our world and stand ready to support and contribute to its responsible advancement.

Sincerely,

A handwritten signature in cursive script that reads "Jason Sim".

Jason Sim, MBA. MS
Co-Chair/Associate Professor of Computer Science
EMAIL: Sim_Jason@sac.edu
Phone: 201-328-5561

Santa Ana College





Amazon Web Services, Inc. ■ 410 Terry Avenue N. ■ Seattle, WA 98109

September 15, 2023

Dr. Rudy Besikof
President, Laney College
900 Fallon St.
Oakland, CA 94607

Re: Letter of Support for Laney College's Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Dr. Besikof:

Amazon Web Services, Inc. (AWS) is pleased to support Laney College in its efforts to include a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum. By introducing a dedicated discipline for AI within the TOP codes, California would be taking a significant step towards ensuring students receive comprehensive and specialized education in this critical field.

AWS Machine Learning University's educator enablement program anticipates that this discipline will have a powerful long-term impact for both the college and a variety of companies with real-world projects spanning many different types of needs. We look forward to helping Laney College and are committed to providing:

- Program advisory board support
- AI/ML curriculum and lab materials support
- AI/ML educator readiness training
- Program awareness support
- Employer network support

This initiative would encompass a wide range of subjects, including machine learning, natural language processing, computer vision, robotics, ethics in AI, data science. It would equip students with the skills and knowledge necessary to not only harness the potential of AI, but also to address the ethical, social, and economic challenges it presents.

The addition of a new discipline for AI in the TOP codes would reinforce California's position as a global leader in technology and innovation. It would attract top talent, encourage interdisciplinary collaboration, and foster partnerships between academia, industry, and government.





Amazon Web Services, Inc. ■ 410 Terry Avenue N. ■ Seattle, WA 98109

AWS Machine Learning University values and appreciates the opportunity to support Laney College. If you have any questions, or require additional information, please contact Dr. Monica Beane, Sr. Program Manager, mabeane@amazon.com.

Sincerely,

Amazon Web Services, Inc.

<p>By:</p> <div style="border: 1px solid black; padding: 2px;"> <p><small>DocuSigned by:</small> <i>Scott Wiltamuth</i> <small>094C3B54FAA1406...</small></p> </div>	<p>Title:</p>
<p>Printed Name:</p>	<p>Date:</p>



September 6th, 2023



President Rudy Besikof, Ed.D.

Laney College President

900 Fallon Street

Oakland, CA 94697

RE: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear President Rudy Besikof, Ed.D.

I am writing to express my strong support for the inclusion of a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum.

Intel is proud to support the collaborative proposal between Laney College Community and their work on Artificial Intelligence. By introducing this dedicated discipline, California would be taking an important step in preparing a dedicated workforce.

Intel (Nasdaq: INTC) is an industry leader. Inspired by Moore's Law, we continuously work to advance the design and manufacturing of semiconductors to help address our customers' greatest challenges. Intel has committed to expanding digital readiness to reach 30 million people in 30,000 institutions in 30 countries. This commitment is part of the company's 2030 Goals that underscore Intel's aim to make technology fully inclusive and to expand digital readiness to people worldwide. Intel's corporate responsibility commitment to positive global impact is embedded in its purpose to create world-changing technology that enriches the lives of every person on the planet.

Intel recognizes the crucial need to develop digital readiness skills in the workforce, including skills in the application and knowledge of artificial intelligence. That is why we created Intel's AI for Workforce curriculum to empower the workforce with necessary Artificial Intelligence skills for jobs in the digital economy. We are pleased to have Laney College utilizing our curriculum.

We believe that this skillset will allow students with experience in software development and data analysis to enhance their skill set to meet both current and future industry needs.

I highly encourage you to support this proposal.

Sincerely,

Michael S Harrison

[Michael Harrison](#)

Government Partnerships and Initiatives

Global Government Affairs

Intel Corporation



Angel G. Fuentes
Dean of Business and Workforce Development
Evergreen Valley College
3095 Yerba Buena Rd.
San Jose, CA 95135
angel.fuentes@evc.edu
408-531-6126
08/31/23

Prof. Tuan Nguyen
Professor of Computer Information Systems
Laney College
900 Fallon St.
Oakland, CA 94607

Subject: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Prof. Nguyen,

I hope this letter finds you well. I am writing to express my strong support for the inclusion of a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum. As a concerned member of the academic community, I believe that recognizing AI as a distinct discipline is of paramount importance to adequately prepare our students for the rapidly evolving technological landscape and to foster innovation within our state.

Artificial Intelligence has emerged as a transformative force across various sectors, from healthcare to finance, manufacturing to entertainment, and beyond. It plays a pivotal role in driving technological advancements, shaping industries, and reshaping the way we interact with the world around us. Given the profound impact AI technologies are having on society, it is crucial that our education system adapts accordingly.

By introducing a dedicated discipline for AI within the TOP codes, California would be taking a significant step towards ensuring that our students receive comprehensive and specialized education in this critical field. This initiative would encompass a wide range of subjects, including machine learning, natural language processing, robotics, ethics in AI, data science, and more. It would equip students with the skills and knowledge necessary to not only harness the potential of AI but also to address the ethical, social, and economic challenges it presents.

Furthermore, the addition of a new discipline for AI in the TOP codes would reinforce California's position as a global leader in technology and innovation. It would attract top talent, encourage interdisciplinary collaboration, and foster partnerships between academia, industry, and government. As AI becomes increasingly intertwined with various aspects of our lives, having a dedicated discipline will allow us to cultivate a workforce that is well-prepared to lead and drive advancements in this dynamic field.

In conclusion, I wholeheartedly endorse the proposal to introduce a new discipline for Artificial Intelligence within the TOP codes. This strategic move would not only benefit our students but also contribute to the growth and vitality of the state's technological ecosystem. I encourage the State of

California Academic Senate to carefully consider this proposition and take decisive action to ensure that our educational institutions are at the forefront of AI education.

Thank you for your time and attention to this matter. I am confident that your thoughtful consideration will lead to positive outcomes for the future of education and innovation in our state. Should you require any further information or support, please feel free to contact me.

Sincerely,



Angel G. Fuentes
Dean of Business and Workforce Development
Evergreen Valley College



FOLSOM LAKE COLLEGE
LOS RIOS COMMUNITY COLLEGE DISTRICT

Date: September 21, 2023

Tuan Nguyen
Professor of Computer Information System
Laney College
900 Fallon St
Oakland, CA 94607

RE: Support of the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Mr. Nguyen,

I'm reaching out to express my deep support for creating an Artificial Intelligence (AI) discipline under the State of California academic curriculum. I believe that AI is an important and distinct field of study that will allow students to be prepared for the rapidly evolving workforce.

Adding AI education to the TOP codes will provide an extensive understanding of machine learning, robotics, ethics, natural language processing, data science and much more. It's imperative for our students to understand and master AI's potential to address its social and ethical connotations.

This advancement would strengthen California's position as a global leader in technology and innovation by attracting talent and building opportunities between academia and the technological industries. AI has become an important part of our lives, and a dedicated discipline will ensure the creation of a proficient workforce.

In response to the rapid advancement of AI technologies and the shortage of a skilled AI workforce. Folsom Lake College has developed a Machine Learning Certificate of Achievement and is in the process of developing an associate degree in Artificial Intelligence and Machine Learning. We believe that this knowledge will allow students to enhance their skillset to meet both current and future industry needs.

I completely endorse this proposal and believe that it will benefit our student population and boost our technological community. I urge the State of California Academic Senate to consider this proposition.

Thank you for your time, and if you have any questions or comments feel free to contact me.

Best,

Suha Aljuboori

Suha Aljuboori, Ph.D

Professor of Computer Science

Folsom Lake College

aljubos@flc.losrios.edu



San José State
UNIVERSITY

General Engineering Office
College of Engineering

Room 491 Engineering Building
One Washington Square
San Jose, CA 95192-0085

Date: August 31, 2023

Tuan Nguyen
Professor of Computer Information System
Laney College
900 Fallon St
Oakland, CA 94607

RE: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Mr. Nguyen:

I'm writing to express my strong support for establishing a dedicated Artificial Intelligence (AI) discipline under California's academic curriculum. Recognizing AI as a distinct field is crucial to prepare students for our rapidly evolving tech landscape and promote innovation.

This addition to the TOP codes would provide comprehensive AI education, covering machine learning, natural language processing, robotics, ethics, data science, and more. It's vital for students to master AI's potential and address its ethical and societal implications.

This move would solidify California's tech leadership, attracting talent and fostering collaboration between academia, industry, and government. As AI becomes integral to our lives, a dedicated discipline ensures a skilled workforce and advancements.

I wholeheartedly endorse this proposal, believing it will benefit students and boost our tech ecosystem. I urge the State of California Academic Senate to consider this proposition seriously.

Thank you for your time and feel free to contact me for more information or support.

Sincerely,

Ahmed Hambaba, Ph.D
Professor of Engineering
College of Engineering
San Jose State University.
ahmed.hambaba@sjsu.edu

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico,
Dominguez Hills, Fresno, Fullerton, Hayward,
Humboldt, Long Beach, Los Angeles,
Maritime Academy, Monterey Bay,
Northridge, Ponomo, Sacramento, San
Bernardino, San Diego, San Francisco, San
José, San Luis Obispo, San Marcos,
Sonoma, Stanislaus

College of San Mateo

August 31, 2023

Tuan Nguyen
Professor of Computer Information Systems
Laney College
900 Fallon St.
Oakland, CA 94607

Subject: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Mr. Nguyen,

I hope this letter finds you well. I am writing to express my strong support for the inclusion of a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum. As a supportive member of the academic community, I believe that recognizing AI as a distinct discipline is of paramount importance to adequately unify and prepare our students for the rapidly evolving technological landscape and to foster innovation within our state.

Artificial Intelligence has emerged as a transformative force across various sectors, from healthcare to finance, manufacturing to entertainment, and beyond. It plays a pivotal role in driving technological advancements, shaping industries, and reshaping the way we interact with the world around us. Given the profound impact AI technologies are having on society, it is crucial that our education system adapts accordingly.

By introducing a dedicated discipline for AI within the TOP codes, California would be taking a significant step towards ensuring that our students receive comprehensive and specialized education in this critical field. This initiative would encompass a wide range of subjects, including machine learning, natural language processing, computer vision, robotics, ethics in AI, data science, and more. It would equip students with the skills and knowledge necessary to not only harness the potential of AI but also to address the ethical, social, and economic challenges it presents.

Furthermore, the addition of a new discipline for AI in the TOP codes would reinforce California's position as a global leader in technology and innovation. It would attract top talent, encourage interdisciplinary collaboration, and foster partnerships between academia, industry,

College of San Mateo

and government. As AI becomes increasingly intertwined with various aspects of our lives, having a dedicated discipline will allow us to cultivate a workforce that is well-prepared to lead and drive advancements in this dynamic field.

In conclusion, I wholeheartedly endorse the proposal to introduce a new discipline for Artificial Intelligence within the TOP codes. This strategic move would not only benefit our students but also contribute to the growth and vitality of the state's technological ecosystem. I encourage the State of California Academic Senate to carefully consider this proposition and take decisive action to ensure that our educational institutions are at the forefront of AI education.

Thank you for your time and attention to this matter. I am confident that your thoughtful consideration will lead to positive outcomes for the future of education and innovation in our state. Should you require any further information or support, please feel free to contact me.

Sincerely,



Alex Kramer, MPA

Director of Workforce Development, College of San Mateo

Steering Committee Member, Artificial Intelligence & Data Analytics (AIDA) Joint Venture

Email: kramera@smccd.edu

Phone: 650-574-6298



September 1, 2023

Tuan Nguyen
Professor of Computer Information Systems
Laney College
900 Fallon St
Oakland, CA 94607

Subject: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Mr. Nguyen,

I hope this letter finds you well. I am writing to express my strong support for the inclusion of a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum. As a supportive member of the academic community, I believe that recognizing AI as a distinct discipline is of paramount importance to adequately unify and prepare our students for the rapidly evolving technological landscape and to foster innovation within our state.

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In conclusion, I wholeheartedly endorse the proposal to introduce a new discipline for Artificial Intelligence within the TOP codes. This strategic move would not only benefit our students but also contribute to the growth and vitality of the state's technological ecosystem. I encourage the State of California Academic Senate to carefully consider this proposition and take decisive action to ensure that our educational institutions are at the forefront of AI education.

Thank you for your time and attention to this matter. I am confident that your thoughtful consideration will lead to positive outcomes for the future of education and innovation in our state. Should you require any further information or support, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads 'Victoria Rivett'.

Victoria Rivett
Emerging Tech Consultant and Education Programs Director
victoria@sustainablelivinglab.org
949-554-9715

Wendy Porter
Director Employer Partnerships
North Far North Regional Consortium
1654 Cooks Way, Chico, CA. 95926
porterwe@butte.edu
530.518.5095
08/31/23

Tuan Nguyen
Professor of Computer Information System
Laney College
900 Fallon St Oakland, CA 94607

Subject: Support for the Addition of a New Discipline in TOP Codes for Artificial Intelligence

Dear Tuan,

I hope this letter finds you well. I am writing to express my strong support for the inclusion of a new discipline under the TOP codes specifically dedicated to Artificial Intelligence (AI) within the State of California's academic curriculum. Helping launch this project to grow AI curriculum in the Bay Area has led me to recognize AI as a distinct discipline of paramount importance to adequately unify and prepare our students for the rapidly evolving technological landscape and to foster innovation within our state.

Artificial Intelligence has emerged as a transformative force across various sectors, from healthcare to finance, manufacturing to entertainment, and beyond. It plays a pivotal role in driving technological advancements, shaping industries, and reshaping the way we interact with the world around us. Given the profound impact AI technologies are having on society, it is crucial that our education system adapts accordingly.

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In conclusion, I wholeheartedly endorse the proposal to introduce a new discipline for Artificial Intelligence within the TOP codes. This strategic move would not only benefit our students but also contribute to the growth and vitality of the state's technological ecosystem. I encourage the State of California Academic Senate to carefully consider this proposition and take decisive action to ensure that our educational institutions are at the forefront of AI education.

Thank you for your time and attention to this matter. I am confident that your thoughtful consideration will lead to positive outcomes for the future of education and innovation in our state. Should you require any further information or support, please feel free to contact me.

Sincerely,

Wendy Porter 9/11/23

Wendy Porter
Director Employer Partnerships
North Far North Regional Consortium