

CIS 096F - Introduction to Artificial Intelligence and Machine Learning

DIVISION/DEPARTMENT:	Laney - Division of Math & Science / L - Computer Information Systems	BOARD OF TRUSTEES APPROVAL DATE:	04/25/2023
ORIGINATOR:	Nguyen, Tuan	STATE APPROVAL DATE:	04/28/2023
STATE CONTROL #:	CCC000637712	CURRICULUM COMMITTEE APPROVAL DATE:	12/02/2022
		REQUISITE VALIDATION:	12/02/2022
		CURRENT EFFECTIVE DATE:	08/01/2023

1. REQUESTED CREDIT CLASSIFICATION:
COURSE TYPE: D - Credit - Degree Applicable
CB08 BASIC SKILL STATUS (PBS STATUS): N - Not Basic Skills
CB24-PROGRAM COURSE STATUS: 1 - Program Applicable

2. DEPT/COURSE NO:
 CIS 096F

3. COURSE TITLE:
 Introduction to Artificial Intelligence and Machine Learning

4. COURSE:
 Laney New Course

TOP NO.: 0799.00 - Other Information Technology*

5. UNITS:
 Variable No

Units (Min) 3.000	Min Total
Lecture Hours (Min) 2.000	35
Lab/Studio/Activity Hours (Min) 4.000	70
Units (Max)	Max Total
Lecture Hours (Max)	0
Lab/Studio/Activity Hours (Max)	0

6. SELECTED TOPIC:
NO. OF TIMES OFFERED AS SELECTED TOPIC: **AVERAGE ENROLLMENT:**

7. JUSTIFICATION FOR COURSE:
 Introduces basic AI concepts and understanding towards professional expectations and culture, and foundations of ML techniques for advanced studies and practices of Classification and Prediction, Natural Language Processing (NLP), Computer Vision (CV), Deep Learning (DL).

8. COURSE/CATALOG DESCRIPTION:
 Artificial Intelligence (AI) basic concepts and Machine Learning (ML) techniques: Classification and Prediction, Natural Language Processing (NLP), Computer Vision (CV), Deep Learning (DL), AI project cycles, culture, and professional expectations.

9. OTHER CATALOG INFORMATION:

- a. **Modular:** No
- If yes, how many modules:**
- b. **Open entry/open exit:** No
- c. **Grading Policy:** Letter Grade Only
- d. **Eligible for credit by Exam:** No
- e. **Repeatable according to state guidelines:** No
- f. **Required for degree/certificate (specify):**
- g. **Meets GE/Transfer requirements (specify):**
- h. **C-ID Number:**
- Expiration Date:**
- i. **Are there prerequisites/corequisites/recommended preparation for this course?** Yes

- 10. LIST STUDENT PERFORMANCE OBJECTIVES (EXIT SKILLS):**
1. Describe the different emerging trends in technology. (I)
 2. Describe the potential impact of AI to our world. (I, II, III, IV)
 3. Identify the three common domains of AI related to data (Deep Learning), computer vision and natural language processing. (II)
 4. Identify systems thinking methods to decompose complex technological, employments, and social issues. (III, IV)
 5. Apply data acquisition techniques to build and examine data. (V, VI)
 6. Use mathematical tools for analyzing different artificial intelligence (AI) applications (VI, VII).
 7. Apply AI fundamentals related to data modeling, acquisition and exploration (VIII).
 8. Apply neural networks (IX).
 9. Apply Python and ML algorithms (X, XI).

11. COURSE CONTENT:

- LECTURE CONTENT:**
- I. [5%] Emerging technologies
 - A. History of integrated circuits, chips
 - B. 5G technology
 - C. Quantum computing technology
 - D. Autonomous vehicles

- E. Internet of Things (IOT)
- F. Current trends
- II. [5%] Domains of AI
 - A. Data and Deep Learning
 - B. Computer vision
 - C. Natural language processing
- III. [10%] AI jobs in industry
 - A. Healthcare
 - B. Security
 - C. Education
 - D. Agriculture
 - E. Entertainment
 - F. Service and transport
 - G. Others
- IV. [10%] Societal implications in AI
 - A. Employment
 - B. Ethics
 - C. Privacy
 - D. Access and inclusion
 - E. Bias
 - F. Environmental impacts
 - G. Regulations
- V. [5%] AI project cycle
 - A. Problem scoping
 - B. Data acquisition
 - C. Data exploration
 - D. Modeling
 - E. Evaluation
 - F. Deployment
- VI. [5%] Data/Data Science
 - A. Structured data
 - B. Unstructured data
 - C. Big data
 - D. Images
 - E. Data mining
 - F. Data storage
- VII. [10%] Mathematical tools
 - A. Graph, slopes, functions
 - B. Probability and statistics
 - C. Vectors and matrices
 - D. Data visualization
- VIII. [15%] AI data fundamentals
 - A. Data
 - 1. Acquisition
 - 2. Analytics
 - 3. Visualization
 - B. Decision trees
 - C. Image classification
 - D. Modeling
- IX. [10%] Neural networks
 - A. Human neural network
 - B. AI fundamentals on neural networks
 - C. Common applications
 - D. Model evaluation
- X. [15%] Python for data analytics
 - A. Statistics
 - B. Python lists
 - C. Jupyter notebooks
 - D. Pandas
 - E. NumPy arrays
- XI. [10%] Machine learning algorithms
 - A. Algorithms
 - 1. Supervised learning
 - 2. Unsupervised learning

3. Reinforcement learning

B. Functions

LAB CONTENT:

1. [10%] Discuss technology trends
2. [10%] Research and assess AI Systems and Society.
3. [10%] Discuss AI-Based Employments
4. [10%] Practice mathematical tools for analyzing different artificial intelligence (AI) applications.
5. [15%] Practice AI fundamentals related to data modeling, acquisition and exploration.
6. [15%] Simulate Neural Networks (deep learning concepts) learning and improving.
7. [20%] Test Python libraries for various statistical data analyses.
8. [10%] Practice ML algorithms.

12. METHODS OF INSTRUCTION:

- Lecture
- Lab
- Multimedia Content
- Critique
- Discussion
- Projects
- Individualized Instruction
- Threaded Discussions
- Visiting Lecturers
- **Other Methods:** Depending on different styles and preferences of the instructors, some of them may choose to include Observation and Demonstration, Discussions, Forums, Online Conferencing, Projects, Individualized Instruction, and more.

13. ASSIGNMENTS:

Out-of-class Assignments (List all assignments, including library assignments. Requires two (2) hours of independent work outside of class for each unit/weekly lecture hour. Outside assignments are not required for lab-only courses, although they can be given.)

Override Outside Class Hours: No

Outside-of-Class Hours (Min): 4.000

Outside-of-Class Hours (Max): 0.000

Override Outside-of-Class Hours (Min):

Override Outside-of-Class Hours (Max):

Out of class Assignment:

1. Problem sets, which are relevant to the content and levels of difficulty presented in the lectures
2. Quizzes and/or examinations

14. STUDENT ASSESSMENT:

- ESSAY (Includes "blue book" exams and any written assignment of sufficient length and complexity to require students to select and organize ideas, to explain and support the ideas, and to demonstrate critical thinking skills.)
- COMPUTATION SKILLS
- NON-COMPUTATIONAL PROBLEM SOLVING (Critical thinking should be demonstrated by solving unfamiliar problems via various strategies.)
- SKILL DEMONSTRATION
- MULTIPLE CHOICE
- OTHER (Describe)
- **Other:** Depending on the various teaching styles of the instructors, some of them may choose to include Online Verbal Examination, Anti-cheating Assessment (blocking online solvers, traceable identification of the questions), Multiple Choice, Matching, Calculated Multiple Choice, Multiple Answer, True/False, Drag & Drop, Multipart Question, Conditional Multipart Question, Scenarios and Simulations, Decision-making Exercises, and more.

15. TEXTS, READINGS, AND MATERIALS:

A. Textbooks:

Fenner, Mark. *Machine Learning with Python for Everyone*. 1 edition Pearson, 2019.

The course content and reading materials will be provided for the students in PDF format. Current up-to-date web resources will be embedded into the institutional CMS Canvas.

*Date is required: Transfer institutions require current publication date(s) within 5 years of outline addition/update.

B. Additional Resources:

Library/LRC Materials and Services:

The instructor, in consultation with a librarian, has reviewed the materials and services of the College Library/LRC in the subject areas related to the proposed new/updated course

Print Materials were reviewed? Yes

Non-Print Materials were reviewed? Yes

Online Materials were reviewed? Yes

Services were reviewed? Yes

Specific materials and/or services needed have been identified and discussed. Librarian comments:

Need recommendations from faculty for non-textbook supplementary print materials.

C. Readings listed in A and B above are:

Primarily college level

16. DESIGNATE OCCUPATIONAL CODE:

CB09 SAM Code: D - Possibly Occupational

17. LEVEL BELOW TRANSFER:

CB21 Levels Below Transfer: Y - Not applicable

18. CALIFORNIA CLASSIFICATION CODE:

CB11 California Classification Codes: Y - Credit Course

19. NON CREDIT COURSE CATEGORY:

Y - Not Applicable, Credit course

20. FUNDING AGENCY CATEGORY:

CB23 Funding Agency Category: Y - Not Applicable (funding not used to develop course)

REQUISITES AND ADVISORIES:

RECOMMENDED PREPARATION:

MATH 100 Mathematics for Artificial Intelligence