CSIT 292: NATURAL LANGUAGE PROCESSING

1. Course Information

Subject
CSIT - Computer Science/ Information Technology

Course Number
292

School
Science, Technology, Engineering, Mathematics

Course Title
Natural Language Processing

2. Hours

Semester Hours
3

Lecture
3

Lab
0

Practicum
0

3. Catalog Description

For display in the online catalog
This course introduces the student to Natural Language Processing (NLP) and how it is used in current Artificial Intelligence and other applications. The steps involved in NLP data processing such as collection, conversion into a “bag of words”, and visualization using the Python language with NLP tools will be demonstrated. The course will cover the various algorithms used in Natural Language Processing and how these algorithms are “trained” to recognize words. Students will use this information learned in this course to develop a language recognition application. Open lab time required.

4. Requisites

Prerequisites
CSIT 192 Introduction to Machine Learning

5. Course Type

Course Type for Perkins Reporting
vocational (approved for Perkins funding)

6. Justification

Describe the need for this course
This is a required course for Computer Science, Associate in Applied Science with Artificial Intelligence Concentration. Students will master the concepts and applications of Natural Language Processing, study the NLP data collection process and NLP algorithms that are used to recognize language. Students will use this knowledge to develop a language recognition application as part of the course.

7. General Education

Will the college submit this course to the statewide General Education Coordinating Committee for approval as a course, which satisfies a general education requirement?
No

If the course does not satisfy a general education requirement, which of the following does it satisfy:

Program-specific requirement

8. Consistency with the Vision and Mission Statements, the Academic Master Plan, and the strategic initiatives of the College

Please describe how this course is consistent with Ocean County College's current Vision Statement, Mission Statement, Academic Master Plan, and the strategic initiatives of the College:

	Add item
1	Offer comprehensive educational programs that develop intentional learners of all ages and ensure the full assessment of student learning in these programs. (Mission Statement)
2	Foster educational innovation through effective teaching-learning strategies, designed to develop and nurture intentional learners who are informed and empowered. (Vision Statement)
3	Employ technology and learning outcomes assessment to ensure student success in an increasingly diverse and complex world. (Vision Statement)
4	Prepare students for entrance into the workforce and empower students through the mastery of intellectual and Practical Skills. (Academic Master Plan)
5	Challenge students to transfer information into knowledge and knowledge into action. (Academic Master Plan)

9. Related Courses at Other Institutions

Transferability of Course

If not transferable to any institution, explain:

This is a required course for Computer Science, Associate in Applied Science with Artificial Intelligence Concentration. There is no known course for the schools listed here where transfer credit will be given.

10. Course Learning Outcomes

Learning Outcomes

	Students who successfully complete this course will be able to:
CLO1	Explain what Natural Language Processing is and current applications of the technology.
CLO2	Describe the NLP data process which includes the topics of data acquisition, collection, conversion (bag of words) and visualization.
CLO3	Investigate the various algorithms used in NLP applications and the techniques used to train these algorithms to recognize language.
CLO4	Build a language recognition application using the various NLP tools examined in the course.
CLO5	Apply the Term Frequency-Inverse Document Frequency (TFIDF) strategy to select and rank important words from a “bag of words” and process the words using a machine learning model in conjunction with the sklearn library.
CLO6	Make use of the various NLP algorithms and tools to build a chatbot.

11. Topical Outline

(include as many themes/skills as needed)

	Major Themes/ Skills	Assignments (Recommended but not limited to)	Assessments (Recommended but not limited to)	Course Learning Outcome(s)
TO1	Introduction to Natural Language Processing a) Describe natural language processing and current applications of the technology b) Describe the difference between natural and formal language c) The fundamental concepts used in NLP d) Future trends of the technology	Reading assignments In-class demonstrations In-class exercises In-class discussion Presentations	Homework Exam	CLO1

TO2	NLP Data Processing a) Overview of NLP data processing b) Collecting data for NLP applications c) Conversion of Data into a “Bag of Words” d) Data Pipelining e) Using Python process and visualize NLP Data f) Storage and maintenance of NLP Data g) Separating dataset for model training	Reading assignments In-class demonstrations In-class exercises In-class discussion Presentations	Homework Exam	CL01,CLO2
TO3	NLP Algorithms a) Understanding of algorithms used in NLP b) Ranking word frequency using Term frequency-inverse document frequency (TFIDF) c) Stemming, Lemmatization and Tokenization d) Training the NLP algorithm e) Machine Learning Models and the sklearn library	Reading assignments In-class demonstrations In-class exercises In-class discussion Presentations	Homework Exam	CLO1,CLO2,CLO3, CLO5
TO4	Language Recognition Application a) Application Design b) Process data for the Language Recognition Application c) Build and test the Application	Reading assignments In-class demonstrations In-class exercises In-class discussion Presentations	Homework Exam	CLO1,CLO3,CLO4,CLO5
TO5	Chatbots a) List the application of Chatbots b) Provide content for the Chatbot using data from online sources c) Cosine similarity function d) Chatbot Functionality	Reading assignments In-class demonstrations In-class exercises In-class discussion Presentations	Homework Exam	CL01-CLO6

12. Methods of Instruction

In the structuring of this course, what major methods of instruction will be utilized?

o Class lecture
o Discussion
o Demonstrations
o Lab assignments
o Programs and online presentations

13. General Education Goals Addressed by this Course (this section is to fulfill state requirements)

Information

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Technological Competency

Yes

Related Course Learning Outcome

CLO1-CLO6

Related Outline Component
TO1-TO5

Assessment of General Education Goal (Recommended but not limited to)
Presentations
Exams
Homework

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Information Literacy
Yes

Related Course Learning Outcome
CLO1,CLO2

Related Outline Component
TO1,TO2,TO3

Assessment of General Education Goal (Recommended but not limited to)
Presentations
Exams
Homework

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Independent/Critical Thinking
Yes

Related Course Learning Outcome
CLO1-CLO6

Related Outline Component
TO1-TO5

Assessment of General Education Goal (Recommended but not limited to)
Presentations
Exams
Homework

14. Needs

Instructional Materials (text etc.):
Appropriate textbooks and/or open educational resources will be selected. Contact the department for current adoptions. Class notes, presentations, software and online materials.

Technology Needs:
College Portal and/or College Distance Learning Platform and/or Textbook or Instructor Website.

Human Resource Needs (Presently Employed vs. New Faculty):
Presently employed.

Facility Needs:
Laboratory classrooms equipped with computer workstations, each configured to support AI applications. Podium computer similarly equipped plus the ability to present audio-video presentations to the class.

Library needs:
NA

15. Grade Determinants

The final grade in the course will be the cumulative grade based on the following letter grades or their numerical equivalents for the course assignments and examinations

A: Excellent

B+: Very Good

B: Good

C+: Above Average

C: Average

D: Below Average

F: Failure

I: Incomplete

R: Audit

For more detailed information on the Ocean County College grading system, please see Policy #5154.

16. Board Approval

History of Board approval dates
New course board approved: August 26, 2021